SCIENCE

A WEEKLY JOURNAL DEVOTED TO THE ADVANCEMENT OF SCIENCE, PUBLISHING THE OFFICIAL NOTICES AND PROCEEDINGS OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

FRIDAY, JULY 8, 1904.

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MSS. intended for publication and books, etc., intended for review should be sent to the Editor of SCIENCE, Garrison-on-Hudson, N. Y.

THE INTERNATIONAL CONGRESS OF ARTS AND SCIENCE.

THE program has now been issued of the congress to be held as part of the Louisiana Purchase Exposition from September 19 to 25 of the present year. The purpose and plan of the congress are thus described:

The idea of the congress grows out of the thought that the subdivision and multiplication of specialties in science has reached a stage at which investigators and scholars may derive both inspiration and profit from a general survey of the various fields of learning, planned with a view of bringing the scattered sciences into closer mutual relations. The central purpose is the unification of knowledge, an effort toward which seems appropriate on an occasion when the nations bring together an exhibit of their arts and industries. An assemblage is, therefore, to be convened at which leading representatives of theoretical and applied sciences shall set forth those general principles and fundamental conceptions which connect groups of sciences, review the historical development of special sciences, show their mutual relations and discuss their present problems.

The speakers to treat the various themes are selected in advance from the European and American continents. The discussions will be arranged on the following general plan:

After the opening of the congress on Monday afternoon, September 19, will follow, on Tuesday forenoon, addresses on main divisions of science and its applications, the general theme being the unification of each of the fields treated. These

will be followed by two addresses on each of the twenty-four great departments of knowledge. The theme of one address in each case will be the fundamental conceptions and methods, while the other will set forth the progress during the last century. The preceding addresses will be delivered by Americans, making the work of the first two days the contribution of American scholars.

On the third day, with the opening of the sections, the international work will begin. About 128 sectional meetings will be held on the four remaining days of the congress, at each of which two papers will be read, the theme of one being suggested by the relations of the special branch treated to other branches; the other by its present problems. Three hours will be devoted to each sectional meeting, thus enabling each hearer to attend eight such meetings, if he so desires. The program is so arranged that related subjects will be treated, as far as possible, at different times. The length of the principal addresses being limited to forty-five minutes each, there will remain at least one hour for five or six brief communications in each section. The addresses in each department will be collected and published in a special volume.

It is hoped that the living influence of this meeting will be yet more important than the formal addresses, and that the scholars whose names are announced in the following program of speakers and chairmen will form only a nucleus for the gathering of thousands who feel in sympathy with the efforts to bring unity into the world of knowledge.

The organization of the congress consists of:

Director of Congresses.—Howard J. Rogers.

Administrative Board.—Nicholas Murray Butler, president of Columbia University, chairman; William R. Harper, president of the University of Chicago; R. H. Jesse, president of the University of Missouri; Henry S. Pritchett, president of the Massachusetts Institute of Technology; Herbert Putnam, librarian of Congress; Frederick J. V. Skiff, director of the Field Columbian Museum.

Officers of the Congress.—President: Simon Newcomb, retired professor U. S. N. Vice-Presidents: Hugo Münsterberg, professor of psychology in Harvard University; Albion W. Small, professor of sociology in the University of Chicago.

The speakers and chairmen in the subjects more especially covered by this journal are:

DIVISION A—NORMATIVE SCIENCE.

Speaker: Professor Josiah Royce, Harvard University.

Department 1—Philosophy.

Chairman: Professor Borden P. Bowne, Boston University. Speakers: Professor George T. Ladd, Yale University; Professor George H. Howison, University of California.

Section a, Metaphysics.—Chairman: Professor A. C. Armstrong, Wesleyan University. Speakers: Professor A. E. Taylor, McGill University, Montreal; Professor Alexander T. Ormond, Princeton University.

Section b, Philosophy of Religion.—Chairman: Professor Thomas C. Hall, Union Theological Seminary, N. Y. Speakers: Professor Otto Pfleiderer, University of Berlin; Professor Ernst Troeltsch, University of Heidelberg.

Section c, Logic.—Chairman: Professor George M. Duncan, Yale University. Speakers: Professor Wilhelm Windelband, University of Heidelberg; Professor Frederick J. E. Woodbridge, Columbia University.

Section d, Methodology of Science.—Chairman: Professor James E. Creighton, Cornell University. Speakers: Professor Wilhelm Ostwald, University of Leipzig; Professor Benno Erdmann, University of Bonn.

Section e, Ethics.—Chairman: Professor George H. Palmer, Harvard University. Speakers: Professor William R. Sorley, University of Cambridge; Professor Paul Hensel, University of Erlangen.

Section f, Æsthetics.—Chairman: Professor James H. Tufts, University of Chicago. Speakers: Mr. Henry R. Marshall, New York City; Professor Max Dessoir, University of Berlin.

Department 2—Mathematics.

Chairman: Professor Henry S. White, Northwestern University. Speakers: Professor Maxime Bôcher, Harvard University; Professor James P. Pierpont, Yale University.

Section a, Algebra and Analysis.—Chairman: Professor E. H. Moore, University of Chicago. Speakers: Professor Emile Picard, The Sorbonne, member of the Institute of France; Professor Heinrich Maschke, University of Chicago.

Section b, Geometry.—Chairman: Professor William E. Story, Clark University. Speakers: M. Gaston Darboux, perpetual secretary of the Academy of Sciences, Paris; Dr. Edward Kasner, Columbia University.

Section c, Applied Mathematics.—Chairman: Professor Arthur G. Webster, Clark University, Worcester, Mass. Speakers: Professor Ludwig Boltzmann, University of Vienna; Professor Henri Poincaré, The Sorbonne, member of the Institute of France.

DIVISION C—PHYSICAL SCIENCE.

Speaker: Professor Robert S. Woodward, Columbia University.

Department 9—Physics.

Speakers: Professor Edward L. Nichols, Cornell University; Professor Carl Barus, Brown University.

Section a, Physics of Matter.—Chairman: Professor Samuel W. Stratton, director of the National Bureau of Standards, Washington. Speakers: Professor Robert W. Wood, Johns Hopkins University; Professor Francis E. Nipher, Washington University.

Section b, Physics of Ether.—Chairman: Professor Henry S. Carhart, University of Michigan. Speakers: Professor James Dewar, Royal Institution, London; Professor DeWitt B. Brace, University of Nebraska.

Section c, Physics of the Electron.—Chairman: Professor Charles R. Cross, Institute of Technology, Boston. Speaker: Professor Ernest Rutherford, McGill University, Montreal.

Department 10—Chemistry.

Chairman: Professor James M. Crafts, Massachusetts Institute of Technology. Speakers: Professor John U. Nef, University of Chicago; Professor Frank W. Clarke, chief chemist, U. S. Geological Survey.

Section a, Inorganic Chemistry.—Chairman: Professor John W. Mallet, University of Virginia. Speaker: Professor Henri Moissan, The Sorbonne, member of the Institute of France.

Section b, Organic Chemistry.—Chairman: Professor Albert B. Prescott, University of Michigan. Speakers: Professor Rudolf Fittig, University of Strassburg; Professor William A. Noyes, National Bureau of Standards.

Section c, Physical Chemistry.—Chairman: Professor Wilder D. Bancroft, Cornell University. Speakers: Professor J. H. Van't Hoff, University of Berlin; Professor Arthur A. Noyes, Massachusetts Institute of Technology.

Section d, Physiological Chemistry.—Chairman: Professor Wilbur O. Atwater, Wesleyan University. Speakers: Professor Albrecht Kossel, University of Heidelberg; Professor Russell H. Chittenden, Yale University.

Department 11—Astronomy.

Chairman: Professor George C. Comstock, director of the observatory, Madison, Wisconsin. Speakers: Professor Edward C. Pickering, director of Harvard Observatory; Professor Lewis Boss, director of Dudley Observatory.

Section a, Astrometry.—Chairman: Professor Ormond Stone, University of Virginia. Speakers: Dr. Oskar Backlund, director of the observatory, Pulkowa, Russia; Professor J. C. Kapteyn, University of Groningen, Holland.

Section b, Astrophysics.—Chairman: Professor George E. Hale, director of the Yerkes Observatory. Speakers: Professor William W. Campbell, director of the Lick Observatory; Professor Herbert H. Turner, F.R.S., University of Oxford.

Department 12—Sciences of the Earth.

Chairman: Professor Nathaniel S. Shaler, Harvard University. Speakers: Professor William M. Davis, Harvard University; Professor Thomas C. Chamberlin, University of Chicago.

Section a, Geophysics.—Chairman: Professor Christopher W. Hall, University of Minnesota. Speakers: Professor E. Wiechert, director Geophysical Institute, Göttingen; Dr. George F. Becker, geologist, U. S. Geological Survey.

Section b, Geology.—Chairman: Professor John C. Branner, Leland Stanford, Jr., University. Speakers: Sir Archibald Geikie, K.C.B., secretary of the Royal Society; President Charles R. Van Hise, University of Wisconsin.

Section c, Paleontology.—Chairman: Professor William B. Scott, Princeton University. Speakers: Dr. A. S. Woodward, F.R.S., British Museum of Natural History, London; Professor Henry F. Osborn, Columbia University.

Section d, Petrology and Mineralogy.—Chairman: Mr. Oliver C. Farrington, Field Columbian Museum, Chicago. Speakers: Professor F. Zirkel, University of Leipzig; Professor W. C. Brogger, University of Christiania.

Section e, Physiography.—Chairman: Mr. Henry Gannett, United States Geological Survey. Speakers: Professor Albrecht Penck, University

of Vienna; Professor Israel C. Russell, University of Michigan.

Section f, Geography.—Chairman: Professor George Davidson, University of California. Speakers: Dr. Hugh R. Mill, director British Rainfall Organization, London; Professor Georg Gerland, University of Strassburg.

Section g, Oceanography.—Chairman: Rear-Admiral Charles D. Sigsbee, United States Navy. Speakers: Sir John Murray, K.C.B., F.R.S., Edinburgh; His Highness, Albert, Prince of Monaco, Monaco.

Section h, Meteorology.—Chairman: Dr. Abbott L. Rotch, Blue Hill Observatory. Speaker: Professor Svante Arrhenius, University of Stockholm, Stockholm.

Department 13—Biology.

Chairman: Professor William G. Farlow, Harvard University. Speakers: Professor Jacques Loeb, University of California; Professor John M. Coulter, University of Chicago.

Section a, Phylogeny.—Chairman: Professor T. H. Morgan, Bryn Mawr. Speakers: Professor Hugo de Vries, University of Amsterdam; Professor Charles O. Whitman, University of Chicago.

Section b, Plant Morphology.—Chairman: Professor William Trelease, Washington University, St. Louis. Speakers: Professor Frederick O. Bower, University of Glasgow; Professor Karl F. Goebel, University of Munich.

Section c, Plant Physiology.—Chairman: Professor Charles R. Barnes, University of Chicago. Speakers: Professor Julius Wiessner, University of Vienna; Professor Benjamin M. Duggar, University of Missouri.

Section d, Plant Pathology.—Chairman: Professor Charles E. Bessey, University of Nebraska. Speaker: Professor Joseph C. Arthur, Purdue University.

Section e, Ecology.—Chairman: Professor Conway MacMillan, University of Minnesota. Speakers: Professor Oskar Drude, Kön. Technische Hochschule, Dresden; Professor Charles Flahault, director of the Botanic Institute, Montpellier, France.

Section f, Bacteriology.—Chairman: Professor Harold C. Ernst, Harvard University. Speakers: Professor Edwin O. Jordan, University of Chicago; Professor Theobald Smith, Harvard University.

Section g, Animal Morphology.—Chairman: Dr. Leland O. Howard, Department of Agriculture, Washington, D. C. Speakers: Professor Charles B. Davenport, University of Chicago; Professor Alfred Giard, The Sorbonne, member of the Institute of France.

Section h, Embryology.—Chairman: Professor Simon H. Gage, Cornell University. Speakers: Professor Oskar Hertwig, University of Berlin; Professor William K. Brooks, Johns Hopkins University.

Section i, Comparative Anatomy.—Chairman: Professor James P. McMurrich, University of Michigan. Speakers: Professor Max Fürbringer, University of Heidelberg; Professor Yves Delage, The Sorbonne, member of the Institute of France.

Section j, Human Anatomy.—Chairman: Professor George A. Piersol, University of Pennsylvania. Speakers: Professor Wilhelm Waldeyer, University of Berlin; Professor H. H. Donaldson, University of Chicago.

Section k, Physiology.—Chairman: Dr. S. J. Meltzer, New York. Speakers: Professor Max Verworn, University of Göttingen; Professor William H. Howell, Johns Hopkins University.

Department 14—Anthropology.

Chairman: Professor Frederic W. Putnam, Harvard University. Speakers: Dr. W J McGee, President American Anthropological Association, Washington, D. C.; Professor Franz Boas, Columbia University.

Section a, Somatology.—Chairman: Dr. Edward C. Spitzka, New York City. Speakers: Professor L. Manouvrier, School of Anthropology, Paris; Dr. George A. Dorsey, Field Columbian Museum, Chicago.

Section b, Archeology.—Chairman: Mr. William H. Holmes, Chief of the Bureau of Ethnology, Washington, D. C. Speakers: Señor Alfred Chavero, director of the National Museum, Mexico; Professor Edouard Seler, University of Berlin.

Section c, Ethnology.—Chairman: Miss Alice C. Fletcher, President of the Washington Anthropological Society. Speakers: Professor Karl von den Steinen, University of Berlin; Professor A. C. Haddon, University of Cambridge.

DIVISION D—MENTAL SCIENCE.

Speaker: President G. Stanley Hall, Clark University, Worcester, Mass.

Department 15—Psychology.

Chairman: Professor Noah K. Davis, University of Virginia. Speakers: Professor J. Mark Baldwin, Johns Hopkins University; Professor J. McKeen Cattell, Columbia University.

Section a, General Psychology.—Chairman: Professor Charles A. Strong, Columbia University. Speakers: Professor Harald Hoeffding, University of Copenhagen; Professor James Ward, University of Cambridge, England.

Section b, Experimental Psychology.—Chairman: Professor Edward A. Pace, Catholic Uni-

versity of America. Speakers: Professor Hermann Ebbinghaus, University of Breslau; Professor Edward B. Titchener, Cornell University.

Section c, Comparative and Genetic Psychology.—Chairman: Professor Edmund C. Sanford, Clark University, Worcester, Mass. Speakers: Principal C. Lloyd Morgan, University College, Bristol; Professor Mary W. Calkins, Wellesley College.

Section d, Abnormal Psychology.—Chairman: Professor Moses Allen Starr, Columbia University. Speakers: Dr. Pierre Janet, professor at the Sorbonne, Paris; Dr. Morton Prince, Boston.

Department 16—Sociology.

Chairman: Professor Frank W. Blackmar, University of Kansas. Speakers: Professor George E. Vincent, University of Chicago; Professor Franklin H. Giddings, Columbia University.

Section a, Demography.—Chairman: Professor D. Collin Wells, Dartmouth College. Speakers: Professor Walter F. Willcox, Cornell University; Professor Harald Westergaard, University of Copenhagen.

Section b, Social Structure.—Chairman: Professor Frederick W. Moore, Vanderbilt University. Speakers: Professor Ferdinand Toennies, University of Kiel; Field Marshal Gustav Ratzenhofer, Vienna.

Section c, Social Psychology.—Chairman: Professor Charles A. Ellwood, University of Missouri. Speakers: Professor Jean G. de Tarde, Collège de France, member de l'Institut, Paris; Professor Edward A. Ross, University of Nebraska.

DIVISION E—UTILITARIAN SCIENCES.

Speaker: President David Starr Jordan, Leland Stanford, Jr., University.

Department 17—Medicine.

Chairman: Dr. William Osler, Johns Hopkins University. Speakers: Dr. William T. Councilman, Harvard University; Dr. Frank Billings, Rush Medical College.

Section a, Public Health.—Chairman: Dr. Walter Wyman, surgeon-general of the U. S. Marine Hospital Service. Speakers: Professor William T. Sedgwick, Massachusetts Institute of Technology; Dr. Ernest J. Lederle, Commissioner of Health, New York City.

Section b, Preventive Medicine.—Chairman: Dr. Joseph M. Mathews, president of the State Board of Health, Louisville, Kentucky. Speakers: Professor Ronald Ross, F.R.S., School of Tropical Medicine, University College, Liverpool; Professor Angelo Celli, University of Rome.

Section c, Pathology.—Chairman: Professor Simon Flexner, director of the Rockefeller Institute. Speakers: Professor Felix Marchand, University of Leipzig; Professor Johannes Orth, University of Berlin.

Section d, Therapeutics and Pharmacology.—Chairman: Dr. Hobart A. Hare, Jefferson Medical College. Speakers: Sir Lauder Brunton, F.R.S., London; Professor Mathias E. O. Liebreich, University of Berlin.

Section e, Internal Medicine.—Chairman: Professor Frederick C. Shattuck, Harvard University. Speakers: Professor Clifford Allbutt, F.R.S., University of Cambridge; Professor William S. Thayer, Johns Hopkins University.

Section f, Neurology.—Chairman: Professor Lewellys F. Barker, University of Chicago. Speakers: Professor Shibasaburo Kitasato, University of Tokio; Professor James J. Putnam, Harvard University.

Section g, Psychiatry.—Chairman: Dr. Edward Cowles, Boston. Speakers: Professor Th. Ziehen, University of Berlin; Dr. Charles L. Dana, New York City.

Section h, Surgery.—Chairman: Professor Carl Beck, Post Graduate Medical School, New York. Speaker: Professor Nicholas Senn, Rush Medical College, Chicago.

Section i, Gynecology.—Chairman: Professor Howard A. Kelly, Johns Hopkins University. Speakers: Dr. L. Gustave Richelot, member of the Academy of Medicine, Paris; Professor John C. Webster, Rush Medical College, Chicago.

Section j, Ophthalmology.—Chairman: Dr. George C. Harlan, Philadelphia, Pa. Speaker: Dr. Edward Jackson, Denver, Col.

Section k, Otology and Laryngology.—Chairman: Professor William C. Glasgow, Washington University, St. Louis. Speakers: Sir Felix Semon, C.V.O., physician extraordinary to the king, London; Dr. J. Solis-Cohen, Jefferson Medical College.

Section l, Pediatrics.—Chairman: Professor Thomas M. Rotch, Harvard University. Speakers: Professor Theodore Escherich, University of Vienna; Professor Abraham Jacobi, Columbia University.

Department 18—Technology.

Chairman: Chancellor Winfield S. Chaplin, Washington University, St. Louis. Speakers: Professor Henry T. Bovey, F.R.S., McGill University, Montreal; Mr. John R. Freeman, Providence, R. I.

Section a, Civil Engineering.—Chairman: Professor William H. Burr, Columbia University. Speakers: Dr. J. A. L. Waddell, consulting engineer, Kansas City; Mr. Lewis M. Haupt, consulting engineer, Philadelphia.

Section b, Mechanical Engineering.—Chairman: President Alexander C. Humphreys, Stevens Institute of Technology. Speakers: Professor A. Riedler, Königliche Technische Hochschule, Berlin; Professor Albert W. Smith, Leland Stanford, Jr., University.

Section c, Electrical Engineering.—Chairman: Professor Arthur E. Kennelly, Harvard University. Speakers: Signor G. Marconi, Italy; Professor Michael I. Pupin, Columbia University.

Section d, Mining Engineering.—Chairman: Mr. John Hays Hammond, New York City. Speakers: Professor Robert H. Richards, Massachusetts Institute of Technology; Professor Samuel B. Christy, University of California.

Section e, Technical Chemistry.—Chairman: Professor Charles F. Chandler, Columbia University. Speakers: Professor Otto N. Witt, Königliche Technische Hochschule, Berlin; Professor William H. Walker, Massachusetts Institute of Technology.

Section f, Agriculture.—Chairman: Honorable James Wilson, Secretary of Agriculture, Washington. Speakers: Professor Léon Lindet, National Agronomic Institute, Paris; Professor Liberty H. Bailey, Cornell University.

THE THIRTIETH GENERAL MEETING OF THE AMERICAN CHEMICAL SOCIETY.

The thirtieth general meeting of the American Chemical Society was held in Providence, R. I., during Tuesday, Wednesday and Thursday, June 21–23, the place of meeting being Rockefeller Hall, on the campus of Brown University. At the opening session President Wm. H. P. Faunce, of the university, delivered an address of welcome, and this was followed by a response on behalf of the society by its president, Professor A. A. Noyes. The members of the local section gave themselves without reserve to providing for the comfort of the visitors, and their hospitality received full appreciation. Luncheons were served in Sayles Memorial Hall on Tuesday and Wednesday by the courtesy of two local companies, T. P. Shepard & Co., and the Rumford Chemical Works. The University Club extended its house privileges to all members of the society during the entire meeting, and on Tuesday evening entertained them at a most enjoyable informal reception. On Thursday afternoon, the members of the local section invited the visitors to attend a Rhode Island clambake at the Pomham Club, on the shore of Narragansett Bay. This 'crowning event' of the meeting was closed by a series of impromptu speeches, when Professor J. H. Appleton, the chairman of the local committee, proved himself a very entertaining toastmaster.

In addition to the regular morning sessions, an open lecture was delivered on Wednesday evening by Dr. H. W. Wiley, of Washington. This was the first public announcement of the results obtained in his important series of experiments upon the effect of the food preservatives, boric acid and borax, on metabolism. A summary of these results appeared in all the leading newspapers in the issue of June 23.

At the close of the last session a hearty vote of thanks was extended to Professor Appleton and his associates and to the various local organizations by whom courtesies were shown to the visiting members. The list of manufacturing concerns that opened their doors to the various afternoon excursion parties is too numerous to be included here.

The number of members in attendance was 128, of whom 104 were visitors. The next meeting will be held in Philadelphia, beginning December 27.

REPORTS FROM INSTITUTIONS.

A new feature was the presentation of reports from various institutions upon the research work which has been in progress during the past year. Lack of space forbids the reprinting of these reports in full, and the following brief summaries, which may serve to give a general idea of the progress of such work, are by no means exhaustive. It should also be said, in justice to those who presented the reports, that

some were made impromptu, in response to special request.

Harvard University.—Aromatic addition products, especially new derivatives of tetrabromorthoquinone. Detection and estimation of small quantities of arsenic and antimony in toxicological work. Dissociation of certain addition products, as phenoquinone, in benzene solution. Atomic weights of iodine, cadmium, sodium, etc. Decomposition of silver oxide above 300°. Conductivity of potassium iodide in melted iodine. Energy changes of iron and nickel. Study of amalgam cells. Study of specific heats of liquids by a new method. Continuations of certain former investigations.

Columbia University.—Various researches in physiological chemistry, some of which have already been published. Organic: On *m*-aminobenzonitrile. Extension of synthetic methods for the preparation of quinazolines. Physical: combination of a solvent with the ions. Dissociation of lead nitrate. Thermo-chemistry of electrolytic dissociation. Ionic equilibrium of solutions of potassium silver cyanide, etc. Industrial: Electrical preparation of metallic magnesium. Extraction of radioactive bodies from carnotite. Analytical: Reduction of lead from litharge in preliminary assays. A crucible charge for gold and silver in zinc ores. Determination of molybdenum in steel, etc. Separation of thorium from cerium, etc. Determination of nitrogen in organic compounds. Determination of formaldehyde.

Massachusetts Institute of Technology.—Physical Chemistry: Dissociation at high temperatures. Conductivity of fused electrolytes; also of very dilute solutions. Test of a method for determining absolute potential. Reaction between potassium sulphocyanate and mercuric sulphocyanate. Hydrolysis of ammonium sulphide. Dissociation relations of sulphuric acid as determined by comparative inverting power, etc. Industrial: Commercial preparation of chloroform from acetylene. Purification of low-grade rosins. Bleaching with sodium hypochlorite. Hydrocarbons in distilled wool grease. Organic: Systematic identification of nitrogen compounds. Experiments with a view to preparing a bivalent carbon compound.

University of California.—Gravimetric determination of free acids. Investigation of California petroleum, and also of tar from oil distillation. Action of nitrogen on various oxides in presence of carbon. Solubility of salts of boric acid in presence of salts of other acids. New method of extraction from sulphide ores. On the existence of ethers of fulminic acid. Chemical reactions of the cyanide process. Coprecipitation of gold and platinum with silver chloride. Constitution of *p*-nitroso compounds. Synthesis of acetylene derivatives.

Yale University.—Kent Laboratory: In addition to eleven papers already published, there are sixteen investigations, some of which are completed but not yet reported upon, while others are still in progress. Sheffield Laboratory: Work on double and triple salts. Heat of combustion of carbon from acetylene. Pyrimidine derivatives. Thiocyanates and isothiocyanates. Triazoles. Laboratory of Physiological Chemistry: Study of certain aspects of nutrition. Paths of excretion for inorganic compounds. Physiological chemistry of the compounds. Physiological chemistry of the invertebrates. Utilization of proteids.

University of Chicago.—Dissociation phenomena in the glycol and glycerin series. Relations between the forms of sulphur. Velocity of saponification of imido ethers. Stereoisomeric chlorimido derivatives and the Beckmann rearrangement. Constitution of purpuric acid.

Preparation of homologous alkyl isoureas. Ionization constants of phenolphthalein, and its use as an indicator. Relation of radium to uranium.

Johns Hopkins University.—Phenylsulphone-orthocarboxylic acid. Effect on zinc of dry hydrochloric acid dissolved in benzene. Clay mixtures and the burning of porous cells. Preparation of cells for osmotic pressure work. Electric combustion furnace. Depression of the freezing point in concentrated aqueous solutions. Conductivity of electrolytes in mixtures of alcohol and water. Decomposition products of sodamide; also its reactions with phosphorus pentachloride and with yellow phosphorus. Temperature coefficients of conductivity from 40° to — 40°. Decompositions of nitroso compounds. A step toward the synthesis of camphoric acid.

University of Wisconsin.—Influence of chemical reaction upon weight. Coloring matters of plants. Soap solutions. Phenoxozone compounds (effect of substitution on the ease of formation of condensation products). Effect of oxidizing agents upon the solubility of gold in various reagents. Formation of alkaline and silver tellurates, of chromium ammonium peroxides, etc. Atomic weight of selenium. Osmosis with solvents other than water and with various membranes.

Leland Stanford University.—Purification of feed waters, especially in arid regions. Spectroscopic study of some rare elements. Methyl amine as a solvent. Reactions in ammonia. Hydrochloric acid addition products of stannous chloride. Modification of freezing-point method for molecular weight determinations. Metastability in the case of sodium thiosulphate; also solubilities of the different forms.

University of North Carolina.—Investigations on thorium and certain of the rare earths; carolinium. Radio-active constituents of monazite sands. Action of radium emanations on minerals. New organic salts of neodymium. Strontium malate. The methoxy group in certain lignocelluloses. Action of bromine on trichlorethylidene diparanitrophenamine.

Verbal reports were also made by Professor Bancroft, representing Cornell University, and Professor Johnson, representing the University of Michigan.

PAPERS.

The following papers were read before the society:

The Ratio of Radium to Uranium in Minerals: Bertram B. Boltwood.

The investigation of a series of nine uranium minerals has led to the conclusion that the amount of radium present in any given mineral is proportional to the uranium content. This would seem to offer strong evidence of the truth of Rutherford's suggestion that radium is formed by the decomposition of uranium. The method employed for the quantitative determination of the radium depends on the measurement of the maximum or equilibrium quantity of emanation formed from the radium salts present.

The Qualitative Separation and Detection of the Group of Elements whose Oxides are Insoluble in Nitric Acid: Arthur A. Noyes.

An account of this work, which is not yet in final form, will be published later in the year.

Note on the Amount of Moisture which Phosphorus Pentoxide Leaves in a Gas: Edward W. Morley.

The author formerly found that the sum of the moisture left, and the phosphorus pentoxide absorbed, in a gas, is not more than a milligram in 45,000 liters. He now finds the phosphorus pentoxide alone to be one milligram in 45,000 liters. To the degree of approximation so far attained,

therefore, it seems that the moisture left in a gas by phosphorus pentoxide is *nil*. A gas may be made as dry as the figures indicate, by passing at the rate of two liters an hour *through* 25 c.c. of phosphorus pentoxide. The difficulty often experienced in filling a glass apparatus with a perfectly dry gas is due to the wetting of the dried gas by the water persistently adhering to the surface of the glass.

Bromides of Ruthenium: JAS. LEWIS HOWE.

These compounds were prepared by the action of hydrobromic acid upon ruthenium tetroxide. Addition of alkali bromides gives brom-ruthenites of the formula $X_2'RuBr_5$, which, when boiled with dilute alcohol acidified with hydrobromic acid, give aqua brom-ruthenates, $X_2'Ru(H_2O)Br_5$. The latter form, on addition of bromine, the salts $X_2'RuBr_6$. All of these salts are analogous and similar to the corresponding chlorides.

Changes in the Composition of the Ferrocyanides of Cadmium, Zinc and Manganese after Precipitation: E. H. MILLER and M. J. FALK.

Several new double ferrocyanides of cadmium, ammonium and potassium were described. The investigation also showed that the precipitate formed in the ordinary titration of zinc in the presence of ammonium chloride is an ammonium potassium zinc ferrocyanide, and not $K_2Zn_3Fe(CN)_6$ as given heretofore.

Silica Determinations: HARRISON EVERETT ASHLEY.

The Atomic Weight of Beryllium: C. L. PARSONS.

An abstract of this paper has recently appeared in SCIENCE in a report of a meeting of the New York section (p. 923).

The 'Drop' Method for Surface Tension as a Means for Ascertaining the Molecular Weight in the Liquid State: J. LIVINGSTON R. MORGAN. (By title.)

The Constitution of the Brasses: WILDER D. BANCROFT.

Six sets of solid solutions crystallize from molten mixtures of copper and zinc. Below 400° only five of these are stable. The α crystals (100–63 per cent. copper at 400°) are yellow, the β crystals (54–51 per cent. copper) are reddish, while the other four series are silvery. Brasses containing 51–40 per cent. copper consist of a mixture of brittle silvery crystals and ductile reddish-yellow crystals. An alloy containing 43 per cent. of copper was shown in which the fracture was silvery, while the polished surface was yellow.

The Transport Number of Sulphuric Acid: O. F. TOWER.

Experiments were made with normal, one half normal, one fifth normal, one tenth normal, one twentieth normal and one fiftieth normal acid and at the temperatures 8°, 20° and 32°.

It was found that the transport number decreases with the concentration and is practically constant at the concentrations one twentieth and one fiftieth normal. The average value found at these concentrations was 0.180 at 20°. At other temperatures between 8° and 32° the following equation holds:

$$n_t = 0.18° + 0.0011(t - 20°).$$

The Hydration of Milk Sugar in Solution: C. S. HUDSON.

By determinations of the initial and final solubility of solid milk sugar hydrate and milk sugar anhydride, conclusions are drawn as to the state of hydration of milk sugar molecules in solution. The change in the hydration proceeds so slowly as to be accurately followed, and the results obtained by other methods are in entire agreement.

Migration of Colloids: W. R. WHITNEY and J. C. BLAKE. (By title.)

The Vapor Pressure of Sulphur at 100° C.: HIPPOLYTE GRUENER.

These determinations, in which carbon dioxide was passed over solid sulphur, resulted as follows:

With prismatic sulphur .... 0.007 mm.
With rhombic sulphur ..... 0.0065 mm.

Although this value is so small, considerable amounts of sulphur pass over when water containing it in suspension is boiled.

Some Notes on Laurent Polariscope Readings: GEO. W. ROLFE and CHAS. FIELD, 3d.

These rotation readings are about 0.2 per cent. lower than those given by the Lippich apparatus. The experiments of the authors indicate that this variation is not due to the imperfections of the polariscope, as asserted by some, but to the nature of the light used.

The Molecular Depression Constant of p-Azoxyanisol: H. MONMOUTH SMITH.

This value has been determined at different times and stated variously to be 750, 654 and 545. A redetermination of this constant was made and a value of 563 obtained. Ketones were found to give an abnormal value 32 per cent. higher than the average found from other classes of compounds.

The Sulphates of Beryllium: C. L. PARSONS.

Of those described, namely, $BeSO_4 \cdot 4H_2O$, $BeSO_4 \cdot 2H_2O$, $BeSO_4 \cdot 7H_2O$, $BeSO_4$, and certain basic sulphates, the first is comparatively stable in moist air, and the second in dry air. There is good evidence that the third does not exist, and the fourth could not be prepared by any methods used by the author. The basic sulphates are probably only solid solutions.

Turpentine and Colophonium of the Northern Pine and Douglas Fir: G. B. FRANKFORTER. (By title.)

Metallic and Other Salts of Eugenol: G. B. FRANKFORTER. (By title.)

The Wurtz Synthesis: JAMES F. NORRIS. (By title.)

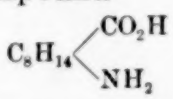
Strontium Malate: ALVIN S. WHEELER and W. MCKIM MARRIOTTE. (By title.)

The Oxidation of Phenylnaphthalenedicarboxylic Acid: JOHN E. BUCHER.

The principal products obtained were diphenyltetracarboxylic acid, two isomeric oxal-diphenyltricarboxylic acids, and a very small quantity of *o*-benzoylbenzoic acid. In addition to these, a number of other acids were found whose constitution has not yet been determined.

The Decomposition of Nitroso Compounds: WILLIAM A. NOYES and R. DE M. TAVEAU.

From the compound



four decomposition products have previously been described by one of the authors. By treatment of the nitroso derivative of the anhydride of this acid with sodium hydroxide and methyl or ethyl alcohol they have now obtained addition products of formaldehyde and acetaldehyde, respectively, with the nitroso compound less the nitroso group. The investigation will be extended to other nitroso compounds.

Substitution in the Aliphatic Series: A. MICHAEL and H. J. TURNER.

When bromine is forced to act upon propane, the effect is confined to the methylene group, while chlorine, which has more free energy, acts not only upon the methylene but also to a smaller extent upon the less susceptible methyl group. An analogous effect is observed in the case of hexane. Each halogen produces more of the secondary substitution product than of the tertiary, but the ratio of their amounts is 4:1 with bromine, and 3:2 with chlorine. Chlorine also yields a larger quantity of primary hexyl chloride than does bromine.

The Effect of Constitutive Influences upon the Additive Power of Carbonyl: A. MICHAEL and H. J. TURNER.

This was studied by observing the stability of the semicarbazones in the presence

of acids of different strengths. The additive power of methyl butyl ketone is greater than that of acetaldehyde; of substituted acetoacetic ester, less than that of the ester.

The Carbon from Acetylene, the Fourth Allotropic Form of Carbon. WILLIAM G. MIXTER. (By title.)

Some Experiments on the Fuel Value of Coal Ashes. HENRY FAY. (By title.)

Bleaching of Flour. EDWARD GUDEMAN. (By title.)

The Action of Water and Salt Solutions upon Certain Slightly Soluble Phosphates: F. K. CAMERON and L. A. HURST.

The hydrolysis was shown to be relatively great, and to depend upon the proportion of solid in contact with the solution. The effect of alkalies and acids was to increase the amount of phosphoric acid dissolved from iron or aluminum phosphate, but the effect of neutral salts could not be predicated.

The Action of Water and Some Solutions on the Phosphates of Calcium: J. K. CAMERON and ATHERTON SEIDELL.

Owing to the similarity between results obtained with iron and aluminum phosphates on one hand and tricalcium phosphate on the other, it was deemed advisable to study also mono- and dicalcium phosphates, which can be obtained as definite and well characterized solids. Monocalcium and tricalcium phosphates are greatly decomposed by water, while dicalcium phosphate is but slightly decomposed and is the stable form under ordinary conditions.

The Solubility of Calcium Sulphate in Solutions of Nitrates: ATHERTON SEIDELL and J. G. SMITH.

Experiments were made with the nitrates of magnesium, calcium, sodium and potassium, the character of the phenomena differing in each case.

The Disinfection of Public Water Supplies: GEORGE A. SOPER. (By title.)

Relation of Chemical Disinfectants to Hygiene and Sanitation: WM. DREYFUS. (By title.)

The Determination of Ammonia in Milk: H. C. SHERMAN and W. N. BERG.

The method described is an adaptation of the Boussingault vacuum distillation as modified by Shaffer for the determination of ammonia in urine. The results obtained in the examination of fresh milk are believed to be accurate within a variation of $\pm$ 0.0003 per cent. and furnish a very delicate means of following certain types of fermentation. The method is being employed in a study of the amounts and significance of ammonia in cows' milk.

The Variations in Standard among Ventzke Saccharimeters: HARRIS E. SAWYER.

Examination of sixteen quartz-wedge saccharimeters,—fourteen being Schmidt and Haensch instruments,—has shown that there seem to be two standards of adjustment among polariscopes of this class.

Five instruments were found which evidently are intended to read 100°, on a 200 mm. column of sucrose solution, prepared and polarized at 17½° C. and containing 26.048 grams of sugar in 100 Mohr c.c. The other eleven instruments were as obviously graduated to read 100° on a solution of the same normal weight, at the same temperature, in 100 true c.c.

The comparison of these instruments was made by the use both of quartz plates and of standard solutions of sugar.

The Colorimetric Estimation of Magnesium: OSWALD SCHREINER and W. S. FERRIS.

Magnesium precipitated with K_2HPO_4, then washed with three per cent. ammonia solution, dissolved in aqueous nitric acid and treated with ammonium molybdate, gives a color suitable for comparison against standard solutions prepared from sodium phosphate. Results were given

showing an agreement of about 0.5 part per million.

The Colorimetric Estimation of Phosphates; Second Method: Oswald Schreiner and B. E. Brown.

The first method previously described requires the precipitation of the phosphorus as the well known yellow molybdate containing phosphorus and ammonia. In this second method the phosphorus is precipitated with magnesia solution, washed with ammonia, dissolved in nitric acid, and read in the colorimeter after addition of molybdate.

Determination of Sulphur and Phosphorus in Food, Fæces and Urine: J. A. Le Clerc and W. L. Dubois. (By title.)

Device for Reading 'Nesslerized' Ammonia Tubes in Water Analysis: W. P. Mason. (By title.)

A Peculiar Occurrence of Bitumen and Evidence as to its Origin: William Conger Morgan. (By title.)

Austin M. Patterson.

MATERIAL VERSUS INTELLECTUAL DEVELOPMENT OF OUR UNIVERSITIES.

The material development of our universities within the past two decades may safely be characterized as phenomenal, and has been more than commensurate with that of the country at large.

As a result the plain inexpensive college buildings of the past now stand by the side of palaces of to-day, while stately gateways and imposing walls flank the carefully graded grounds that once constituted the relatively unkempt campus.

Public taste is being awakened and directed to an appreciation of the beautiful. But apart from the esthetic side the equipment of scientific laboratories and the development of college libraries and museums have been distinguishing features in the recent growth of our institutions of higher learning.

The surroundings of the student are now far more hygienic than in the past, and things once regarded as luxuries are now rightly considered necessities of life. As an evidence of this we need only quote the following from a recent annual report of the president of Harvard University: "The practise of fifty years ago at Harvard College in respect to ventilation would now be against the law, * * * and public opinion would not now endorse the complete absence of bath-rooms from the dormitories owned by the college, an absence which occasioned very little remark down to the year 1890."

But lest we praise too unstintingly this unparalleled progress of the past twenty years, we should seriously consider whether the intellectual welfare of our universities is developing in even measure with their material progress.

The beauty of college grounds and stately buildings can not of itself elevate public taste, nor can extensively equipped laboratories turn out great workers in the fields of science. Too often, indeed, these things stultify through the very sense of satisfaction they engender in our minds. A wooden shed at Penikese was a sufficient opportunity for an Agassiz, and the dull routine of a colliery was but an incentive to the inventive mind of a Stephenson.

The age demands strong men and we must learn to respect our colleges not for their wealth in material things, but for having been the cradle and the home of leaders of thought and action.

A study of the reports of the commissioner of education and of announcements of college presidents and other officers may throw some interesting light upon certain phases of the intellectual and material progress of our colleges. Certain features, such as the increase in the number of students, the growth of libraries, the increase in the faculties and the development of the

post-graduate schools, may, if taken together and closely analyzed, be considered to provide a fair index of the intellectual growth of our colleges.

On the other hand, the increase in total value of the property, the increase in endowment funds, annual cost of buildings and the amounts of benefactions and appropriations for college buildings and grounds may contribute more or less directly to intellectual growth, but are not necessarily indicative of such development.

The fact is that the material progress of our colleges has in the past twenty years outstripped the *intellectual,* and while they have unquestionably grown as centers of learning, growth in *material* wealth has been the great distinguishing feature of their progress.

For example, we find that in the year 1902 there were 1.53 times as many colleges and universities in the United States as there were in 1890. During the same period, however, the number of students increased 1.9 times, or in even greater ratio than the number of colleges. This certainly is indicative of a growing desire, or a better ability, to take advantage of a college education, and yet the total number of students in 1902 was but 107,391, or less than one seven-hundredth of our population.

The student of 1902 found twice as many teachers in the colleges as compared with his predecessor of 1890, but as the number of students had also doubled, the classes under each teacher were on the average as large as were those of 1890. It appears that our colleges, as a whole, have not been able to increase the teaching force in greater ratio than the growth of the student body, although it has long been recognized that small classes, or divisions, are necessary in order to secure the paramount advantage to the student of a close personal relation with his teacher.

Our most progressive universities have, however, striven earnestly to attain this end, but have been able to achieve it only by appointing a large number of young instructors and assistants at small salaries. Indeed, the average salary paid to members of the faculty in our leading eastern universities has declined steadily. At the same time the percentage of instructors, assistants and other subordinates serving upon the teaching force has risen.

In other words, the teaching is now performed more largely by young and poorly paid men. Albeit, however, young as they be, they are men the average of whose ability is high.

The case of two of our greatest eastern universities is typical of the general situation: In one of these in 1889–90, 39 per cent. of the teaching force were professors or assistant professors, and the average salary was $1,500; in 1892–03, however, the number of professors and assistant professors had decreased to 28 per cent. of the total number of teachers, while the average salary had declined to $1,257.

In another great institution in the New England states, 49 per cent. of the teachers were professors or assistant professors in 1890, and the average salary was $1,454; while in 1902–03, only 37 per cent. of the faculty were professors and the average salary was about $1,355.

Promotion within the faculty of these great institutions has become so slow that it may be not inaptly compared with this condition within the United States Navy between the years 1868–98, when gray-haired lieutenants were the rule. The years of struggle have been lengthened for the aspirant to collegiate position, and college teachers of marked ability are now ordinarily men of middle age before being promoted to an assistant professorship.

This condition of affairs can not fail but to react unfavorably upon the universities

themselves, for the best young men of our land must realize all too fully that effort and ability sufficient to win high honor in the professions, or in business affairs, will avail but little if exerted within the college walls, and that for many years they and their families must live upon less than is earned by railway conductors, or baggage inspectors in the custom house.

It is, indeed, an open question at the present day whether the members of our greatest faculties compare favorably in judgment, or even in character, with leaders in law, medicine or affairs. Too often one feels that the narrowing influence produced by years of poverty has had its final effect upon the minds of many of our best scholars. Unless conditions be changed the faculties of our universities must surely deteriorate, and the cause of education will suffer incomparably; and is now suffering to a greater degree than even the intelligent public realize.

A certain lack of public respect for our great scholars is another but closely related factor that operates against the true interests of education. The names of Whitney, Gray, Leidy and Peirce have an unfamiliar sound to us in comparison with those of Max Müller, Sir Joseph Hooker, Sir Richard Owen and Sir George Airy, their foreign contemporaries of no greater worth.

It is true that the hope of being able to advance the good of the world should be a sufficient incentive to our effort; but men are not abstractions of philosophy, and grievously underpaid and unhonored professions will fail to enlist the interest of our ablest youth.

But to consider another phase of the intellectual growth of our colleges; one of the most recent as well as the most hopeful is the development of post-graduate schools by all of our leading universities. It is here, and here only, that advanced and productive scholarship appears among the student body. The love and ambition for research is fostered here, and comparison between our universities and those of Germany can only be instituted with reference to our post-graduate schools, for only in this direction of progress do we approach the German standard.

Yet in 1902–03 the graduate students were but 4.6 per cent. of our student body, and if the graduate schools increase at the rate at which they have developed since 1890, more than a century must elapse before one half of the students in our universities will be in the graduate school. No great progress can be expected until the colleges can afford to appoint leaders of thought to professorships, the duties of which shall be confined to the graduate school. It seems, indeed, remarkable that this has not been done, for we have long since recognized that a primary condition of successful management demands that special faculties shall preside over the affairs of our medical, law, technical and other schools under the auspices of universities. Why should our graduate schools be without a special faculty? The work of the graduate school centers upon research, and it is, indeed, significant that the greatest encouragement ever given to research in pure science has come not from our colleges, but from one whose unparalleled success was achieved through the practical application of principles of science to industrial effort.

There is yet another standard by which we may measure the intellectual growth of our colleges. Their libraries in 1902 contained 2.1 times as many volumes as in 1890. Public libraries not connected with colleges, however, achieved the same increase in the same interval.

We now approach the consideration of the growth of our colleges in material things between 1889–90 and 1902, and the

TABLE SHOWING THE MATERIAL AND THE 'INTELLECTUAL' RESOURCES OF UNIVERSITIES AND COLLEGES OF THE UNITED STATES IN 1902; AND THEIR INCREASE SINCE 1889–1890.

Material Resources, 1902.	Amount.	Ratio of Increase Since 1889–'90.	'Intellectual' Status, 1902.	Total Number.	Ratio of Increase Since 1889–'90.
Total value of property.	$417,205,234	2.83	Number of universities and colleges.	638	1.53
Value of grounds and buildings.	154,529,288	2.4	Number of students.	107,391	1.9
Endowment funds.	185,944,668	2.5	Post-graduate students.	4,942	2.47
Benefactions received during the year 1902.	17,039,967	2.8	Number of teachers.	15,945	2
Appropriation received from states, cities, etc.	6,437,493	4.5	Number of books and libraries.	8,784,307	2.1
Cost of buildings erected during the year 1902.	5,680,000 at least	2.8 at least			
Income exclusive of benefactions.	33,863,244	3.3			

result of our studies may be summarized in the accompanying table.

Inspection of this table will reveal the fact that in the interval between 1889–90 and 1902 the material resources of our colleges have become from 2.4 to 4.5 times as great as at the beginning of this period, while their 'intellectual' resources, measured by the increase in schools, students, teachers and books, have become only from 1.53 to 2.47 times as great as in 1890.

The progress of our colleges in the past twelve years has been material rather than intellectual.

It is not the purpose of this article altogether to decry this progress, for many conditions have rendered it for the time, at least, desirable or even necessary, but it must be checked erelong and the *intellectual* side, the soul of the college, developed in greater ratio.

College presidents and boards of trustees must realize that imposing buildings and expensively equipped laboratories will not make universities. I grant that in our country it is usually far easier to gather funds for the erection of buildings than for the development of unseen things, but this fact alone should be a stimulus to those to whom the destiny of our colleges is entrusted to seek even more ardently for aid in the adequate endowment of professorships, for funds required in the prosecution and publication of research, for the enlargement of learned libraries, and for all things pertaining to the intellectual life of the college. Men who give of their wealth to aid our colleges are usually actuated by unselfish motives, and would gratefully receive the advice of those in control of the destiny of education, to advance the highest even if unseen, rather than to create the spectacular and superficial.

ALFRED GOLDSBOROUGH MAYER.
MARINE BIOLOGICAL LABORATORY,
TORTUGAS, FLA.

SCIENTIFIC BOOKS.

The Vegetable Alkaloids. With particular reference to their chemical constitution. By Dr. AMÉ PICTET, Professor in the University of Geneva. From the second French edition. Rendered into English, revised and enlarged, with the author's sanction, by H. C. BIDDLE, Ph.D., Instructor in the University of California. New York, John Wiley & Sons; London, Chapman & Hall, Limited. 1904. 8vo. Pp. vii + 505. Cloth, $5.00.

The publication of the classical work on 'Die Pflanzenstoffe' by Dr. August Huse-

mann, in 1871, marked the beginning of monographic work on proximate plant constituents. This work was revised in 1882, but no subsequent revisions have been made, and no other work has been published to take its place, doubtless owing to the great labor involved in collaborating the extensive researches of the past twenty-five years. Even 'Die Rohstoffe des Pflanzenreiches' by Wiesner, the second edition of which appeared not long ago (1902), required the assistance of a dozen collaborators. In more recent years the tendency has been for authors to confine their attention to single groups of plant constituents, as for example, the study of the carbohydrates by Tollens; the ethereal oils, by Gildemeister and Hoffmann, etc. One of the earliest of these works was that of Pictet on the 'Chemical Constitution of the Vegetable Alkaloids,' and the present work by Dr. Biddle is not only an English translation, but a revision of Pictet's work.

It is almost a hundred years since Sertürner, an apothecary of Hanover, isolated the first basic organic substance, or alkaloid. He obtained from opium a body termed by him *morphium,* which he compared to ammonia. This subject, however, did not arouse any special interest until about 1817, and during the next twenty years a number of the most important vegetable alkaloids were discovered, including emetine, strychnine, caffeine, quinine, nicotine, conine, atropine, aconitine, etc. The complex nature of these alkaloids rendered their study difficult, until Liebig showed that they are merely ammonia bases in which a hydrogen atom is replaced by an organic radical. This view was later confirmed by the classical researches of Wurtz and Hofmann, which led, nearly fifty years after Sertürner's isolation of morphine, to the first synthesis of an organic base, viz., conine, by Ladenburg.

It was found that most of the vegetable alkaloids are derivatives of pyridine, a compound discovered by Anderson in 'Dippel's oil,' a product obtained by the dry distillation of bones. Not all the alkaloids, however, are related to pyridine, some, as caffeine and theobromine, being uric acid derivatives, as pointed out by E. Fischer, in 1883. Betaine, muscarine and some others are closely related to the amines of the fatty acids, while still others, as leucine and glutamine, belong to the asparagine group.

The fact that most of the alkaloids were found to be in the nature of pyridine bases led to the study of the constitution of these bases as found in coal tar. Under the leadership of Hofmann research in this particular field was followed with a great deal of enthusiasm, and to him belongs the credit of first establishing the constitution of an alkaloid, viz., conine, the chief alkaloid of poison hemlock, which later was prepared, as already stated, synthetically by Ladenburg.

At the present, not only on account of the scientific interest of the subject, but also because of the economic value of these products, a large number of investigators are devoting attention to the study of the chemistry of the alkaloids. The result is a voluminous literature, and it is fortunate for not only students of chemistry and phyto-chemistry, but others as well, that these results have been brought together in the volume at hand. The work is divided into two parts, the first dealing with the artificial bases closely related to the natural alkaloids, and the second with the chemical behavior of the alkaloids and the bearing of this on their chemical constitution. The book has been brought up to date in most instances, as seen by the incorporation of the brilliant investigations of Ladenburg, Merling and Willstätter on the synthesis of atropine, atropamine, belladonnine, inactive cocaine and tropacocaine; the recent investigations of Von Gerichten and Knorr on morphine and codeine; the studies of Gadamer as well as Dobbie and Lauder on corydaline; Willstätter and Fourneau's work on lupinine; Rauwerda's work on cytisine; and also the extensive studies on the alkaloids of jaborandi, tobacco, coffee, etc., by Jowett, Pinner, Pictet, Fischer and various other investigators. There are, however, a number of recent investigations, the results of which are not included, but which would enhance a work of this kind, as

that of Miller on the constitution of ephedrine; the researches of Paul and Cownley on the alkaloids of ipecac; and those of Fischer, Schlotterbeck and others on various alkaloids, which have been published in the past few years in the *Proceedings of the American Pharmaceutical Association*. The physiological properties given in connection with some of the alkaloids might well be omitted in a work of this kind, particularly as a few of them are not entirely accurate. The index would be more helpful if the plant names were included in all cases, in addition to the names of the alkaloids derived from them. An enlargement on the parts dealing with physical properties and important chemical tests would add to the value of the book and make it appreciated by a larger number.

HENRY KRAEMER.

SCIENTIFIC JOURNALS AND ARTICLES.

THE June number (volume 10, number 9) of the *Bulletin of the American Mathematical Society* contains: Report of the April Meeting of the Chicago Section of the Society, by T. F. Holgate; 'The Heine-Borel Theorem,' by Oswald Veblen; 'On Self-Dual Scrolls,' by C. H. Sisam; 'On Some Tendencies in Geometric Investigations,' by Corrado Segre; Reply to Professor Snyder's Review of Study's Geometrie der Dynamen, by Eduard Study, with Note by Virgil Snyder; 'Notes'; 'New Publications.'

The July number of the *Bulletin* contains: Report of the April Meeting of the Society, by F. N. Cole; Report of the April Meeting of the San Francisco Section, by G. A. Miller; 'On Linear Homogeneous Difference Equations and Continuous Groups,' by Saul Epsteen; Review of Warren's Experimental and Theoretical Course of Geometry, by R. E. Moritz; a number of 'Shorter Notices'; 'Notes'; 'New Publications'; 'Thirteenth Annual List of Published Papers'; Index of Volume 10.

A general index of the *Bulletin*, from 1891 to 1904, is in preparation.

The American Journal of Science for July contains the following articles:

H. A. BUMSTEAD: 'Atmospheric Radio-activity.'

T. HOLM: 'Studies in the Cyperaceæ.'

C. E. BEECHER: 'Note on a New Permian Xiphosuran from Kansas.'

C. BASKERVILLE and G. F. KUNZ: 'Kunzite and its Unique Properties.'

R. O. E. DAVIS: 'Analysis of Kunzite.'

E. H. KRAUS: 'Occurrence of Celestite near Syracuse, N. Y., etc.'

L. F. WARD: 'Famous Fossil Cycad.'

H. A. PERKINS: 'Comparison of Two Ways of Using the Galvanometer.'

H. E. MEDWAY: 'Further Work with the Rotating Cathode.'

H. L. BRONSON: 'Transverse Vibrations of Helical Springs.'

D. B. STERRETT: 'New Type of Calcite from the Joplin Mining District.'

J. TROWBRIDGE and W. ROLLINS: 'Radium and the Electron Theory.'

J. P. ROWE: 'Pseudomorphs and Crystal Cavities.'

SOCIETIES AND ACADEMIES.

THE TORREY BOTANICAL CLUB.

THE club met in the morphological laboratory at the New York Botanical Garden, March 30, 1904.

The first paper on the scientific program was 'Notes on the Cytology of the Aquatic Fungi,' by Dr. Cyrus A. King. Schroeter's classification of the Phycomycetes was reviewed and attention called to the fact that the conidia of the Peronosporineæ resemble sporangia since they germinate by forming internal zoospores. In the Saprolegniaceæ, according to Trow, the eggs are at first multinucleate, all except the sexual nucleus in each egg being disposed of by digestion. Dr. King's researches have shown that in the Leptomitaceæ, as far as known, the oogonia are at first multinucleate and the supernumerary nuclei are disposed of by migrating to the periphery of the cell where they are cut off in a distinct periplasm. In *Araiospora* the peripheral nuclei surround themselves with cell walls in such a way that the ooplasm is surrounded by a layer of periplasmic cells. In *Sapromyces* there is also a periplasm in which the nonsexual nuclei are cut off; it is, however, reduced to a very thin layer. The formation of a body in the center of the egg

of *Araiospora* by the coalescence of several small cytoplasmic patches from various parts of the ooplasm was described. The body probably is an attraction center for the sexual nuclei. A similar structure was not found in *Sapromyces*. *Rhipidium* was also briefly described. The presence of a periplasm and the migration of the nuclei from the developing egg indicates that the Leptomitaceæ are more closely allied to the Peronosporineæ than to the Saprolegnineæ. Photomicrographs were shown from Dr. King's preparations showing the facts brought out and showing also indirect nuclear division in the oogonium and zoosporangium of *Sapromyces*.

An interesting discussion followed.

The second paper of the afternoon was by Mr. B. C. Gruenberg and was entitled 'Chemical Investigations on *Hæmatoxylon*.' Hæmatoxylin is one of the most valuable of commercial dyes and the business of supplying the wood from which it is made forms an important industry in some of the West Indies. Considerable annoyance has been caused by the fact that some of the logwood or *Hæmatoxylon* trees contain little or no dye, whole shipments even having been condemned on this account. The so-called 'bastard logwood' is not always to be distinguished at the time of cutting. It is either lighter in color or if dark at first it can be recognized by not becoming still darker on seasoning for some months as does the good wood.

Professor Earle investigated the disease in the field and concluded that the lack of pigment was not due to external conditions, or to disease, or to immaturity, but that the logwood is a variable plant and the bastard form is a variety or subspecies.

The percentage of carbon in the ash-free material was determined for different samples with somewhat varying results, but showing that the good wood contains a slightly higher percentage, due probably to the carbon in the pigment.

Analysis of leaves, stems and roots of one-year-old plants showed that the bastard plants contained slightly more ash and water, but the difference was very slight.

Extracts of the pigment were made with a number of different solvents from varying samples of wood. The extracts with different solvents did not give parallel results as indicating the amount of pigment. In diluting the extracts chemical changes occurred. Alkalies increase the color of extracts of the good wood but not extracts of the bastard wood. Acids have a parallel effect.

Results on the soluble substances in the wood were not satisfactory on account of decomposition on drying. There are probably several pigments.

After a discussion of the paper the meeting adjourned.

William T. Horne,
Secretary pro tem.

The Academy of Science of St. Louis.

At the meeting on April 4, Dr. C. Barck read a paper on 'The History of Spectacles.'

The essayist divided the subject into two parts, the development of the industrial art, and the evolution of the scientific selection. In regard to the former, it is an open question whether the Chinese invented glasses prior to the Europeans. Of the ancient nations of western Eurasia, we possess only one relic, namely, a convex lens of rock crystal which was discovered among the ruins of old Nineveh by Sir Layard. To the Egyptians, Greeks and Romans glasses were unknown. The latter assertion does not agree with the common opinion, as expressed in the belief that Nero was near-sighted and used glasses. But this is due to a misinterpretation of a passage of Pliny, as proved at length by the reader of the paper. During the first twelve centuries of the Christian era there is no mention of spectacles; they were invented at the end of the thirteenth century by two Italians, Armati and Spina, either independently or conjointly. This is proved by a number of documents. The essayist then dwelt upon the gradual spread of their use, and the improvement of the frames and lenses. At first only convex lenses were used, concave ones being employed about two centuries afterwards. Cylindrical lenses for the correction of astigmatism, which had been discovered by Thomas Young in 1801, were devised by the astron-

omer Airy in 1827. Bifocals were invented and first used by Benjamin Franklin, 1785. As to the selection of the appropriate lenses, this was at first done by the peddlers who sold them. Physicians for a long time paid no attention to it. Even after the epochal work of the astronomer Kepler had opened a new era in optics by demonstrating the physiology of the act of vision, 1604, physicians maintained their reserved attitude and considered it below the dignity of their profession to have anything to do with the selection of glasses. It was only in the middle of the last century that the change took place. This was due mainly to the labors of Helmholtz and Donders, who laid the foundation for the adjustment of lenses according to mathematical and optical principles. The invention of the ophthalmoscope, by which the refraction can be determined objectively; of the ophthalmometer, which measures the astigmatism of the cornea; and the introduction of remedies, by which the accommodation can be paralyzed followed in rapid succession. By means of these instruments and methods of precision, the medical adviser is governed by well-established laws in the selection of spectacles, and this now belongs to the domain of science. The lecture was illustrated by a number of copies of old paintings and by drawings.

DISCUSSION AND CORRESPONDENCE.

GEO-BIOLOGICAL TERMS.

THE fundamental idea of *bios* is not conveyed by the new terms proposed by Dr. Dall in SCIENCE (No. 494) for indicating collectively 'land and fresh-water organisms.' By analogy with Leibnitz's protogæa, or the primordial world, epigæa would apply to the superficies of the earth, and the literal meaning of namatogæa is 'stream-world.' Correctly formed substantives are geobios and limnobios, proposed by Haeckel as the equivalents of terrestrial and fresh-water faunæ respectively. These may be readily combined in GEO-LIMNOBIOS; or, if an adjective form is desired, AQUA-TERRESTRIAL, or compounds of *terrestris* with *mare*, *fluvius*, *lacus*, etc., suggest themselves. *Aqua* having the general significance of fresh water (*aqua pluvia, aqua fontana, aqua cælestis,* etc.) as opposed to salt, the distinction between aqua-terrestrial and marino-terrestrial is sufficiently obvious. Shorter than any of these, however, is the Greek adjective form, GEO-LIMNOUS.

Those who are in the habit of following the discussion of neologisms in SCIENCE may recall the sprightly flow of opinion that continued for some time in these columns (Vols. V. and VI.) in regard to certain physiographic extravaganza, such as 'Shickshinnies' for synclinal valleys, 'remolino' for pot-hole, 'cuesta' for hill-slope, etc. If we may be forgiven for appearing ironical, it deserves to be pointed out that some of the more euphuistic of the terms proposed about that time are preoccupied. For instance, a round dozen of soft Spanish exotics were imported by Arthur Schott upwards of fifty years ago (*Proc. A. A. A. S.*, 1856, p. 33), but for some reason they failed to germinate. Priority, strictly enforced, might quicken them with new life; then pot-hole, or 'remolino,' would acquire the chastened form of *tinaja,* the homely but expressive 'sink' would give way to *charco,* and base-level to *loma.* The first of these is defined as 'a water-hole in solid rock, usually met with in crevices and ravines of rocky mountains.' *Charco* is a name given to "water-pools found usually in lower and level places. They are formed either by the decay of rocks or by washing out of beds of clay." *Loma* is 'a long narrow mountain or hill-ridge, with a level horizon.'

C. R. EASTMAN.

HARVARD UNIVERSITY.

A REPLY TO CERTAIN CRITICISMS OF PROFESSOR GIARD RESPECTING THE BOPYRIDS.

PROFESSOR ALFRED GIARD, a master in the knowledge of the Bopyridæ, has done me the favor to examine and criticize the results of my recent studies on that group.* Professor Giard has aptly affirmed that a copy of Bonnier's volume 'Contribution à l'étude des Bopyridæ' (*a*)† ought to be found in Wash-

* See *C. R. Soc. de Biologie*, LVI., 1904, April 22, pp. 591–594.

† The letters in parentheses refer to the bibliography at the end of the article.

ington. Unfortunately none of the libraries here has been favored with his work,—not even the Smithsonian Institution, which is very liberal in the distribution of its publications throughout the world. It is to be regretted that the scientific institutions in France have not responded to the offer of exchanges from the Smithsonian Institution and as a result many of their publications are not to be had here. Before the publication of my 'Contributions to the Natural History of the Isopods' (*e*), I made every effort to secure Bonnier's work, without success. After writing to other libraries in this country, I have since succeeded in securing the loan of the volume from the Museum of Comparative Zoology at Harvard College.

With the humility of a disciple, I admit that I was in error (as I discovered before the criticism appeared) in considering that Giard and Bonnier had identified *Grapsicepon fritzi* with the species of *Bopyrus* found by Fritz Müller on an *Alpheus* (*c*). The name *Bopyrus alphei,* it appears, was given by Giard and Bonnier in 1890 (*b*) to the form found by Müller on a species of *Alpheus,* but as no description or figure ever appeared until those I gave in 1900 (*d*), ten years later, I think no zoologist would quote Giard and Bonnier as the authority of the species, a name without a description or figure not being usually accepted. I do not agree with Professor Bonnier in placing *Bopyrus alphei* in the genus *Bopyrella,* for I consider it a true *Probopyrus,* where I have recently placed it, the abdomen of the female being segmented. My figure is misleading, as it shows no segmentation, but, at the time it was made, I could not distinguish any segmentation in the specimen at hand, which was very transparent and colorless. Since receiving other specimens, I have been able to see distinctly the segmentation of the abdomen. In *Bopyrella* the abdominal segments are all fused.

During the short time that Professor Bonnier's work was in my possession, I was not able to examine all that it contains, but I noted the great similarity of my genus *Parapenæon* to his genus *Orbione.* I do not, however, consider my genus a synonym of *Orbione,* for it differs in not having the sixth segment of the abdomen of the female produced into pleural lamellæ, that segment in *Parapenæon* being very small and rounded. In the type species of *Orbione* the pleural lamellæ are produced to such an extent that they reach beyond the extremity of the uropoda. The second species of *Orbione, O. incerta,* described by Professor Bonnier, differs in this respect from the type species and may come under my genus *Parapenæon.* The author suggests that the second species of *Orbione* may represent a new genus. The female of *Parapenæon* agrees more with the female of *Cryptione* Hansen than it does with the female of *Orbione,* but the males in the two genera are very unlike. When the male of *Orbione* is known, there may be other characters to differentiate *Orbione* from both *Parapenæon* and *Cryptione.* At present *Parapenæon* is quite as distinct from *Orbione* as *Orbione* is from *Cryptione.*

Urobopyrus Richardson is certainly very close to *Palægyge* Giard and Bonnier, but can not be considered a synonym. In the female of *Urobopyrus* 'the uropoda are a pair of *double*-branched appendages attached to the terminal abdominal segment; the inner branches are smaller and more slender than the outer branches.' The female of *Palægyge* has small, *simple,* rudimentary, knob-like uropoda, not lamellar in shape nor elongated so as to extend beyond the terminal segment as is found in *Urobopyrus.*

In speaking of the thoracic processes in the adult female of *Argeia* as not being of epimeral origin, but arising from the posterior portion of the segment, I made the statement that it was incorrect to refer to them as 'lames pleurales.' My idea was not to suggest that Giard and Bonnier had confounded the 'lames pleurales' with the 'productions épimériennes,' but rather to point out that, in a strict sense, it is not exact to speak of them as 'lames pleurales.' They may be considered as the posterior divisions of the 'lames pleurales,' that view being now generally accepted, the anterior division of the 'lames pleurales' being placed lateral to the ovarian bosses on the anterior portion of the

segments. In *Argeia,* therefore, the 'lames pleurales' are in two parts, an anterior and a posterior part, and it is not exact to refer to these thoracic processes, which arise from the posterior portion of the segments, as the 'lames pleurales' of the segments.

In conclusion, I wish to state that I am not more willing to accept the 'loi naturelle' than I was to accept the 'hypothèse' postulated by Giard and Bonnier until its confirmation has been maintained by facts. Professor Giard states that I have not carefully studied *Argeia pugettensis* coming from different hosts. I hope soon to give in greater detail the results of my researches on this form and on *Bopyroides hippolytes.*

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HARRIET RICHARDSON.

SPECIAL ARTICLES.

AN ACCOUNT OF THE PRELIMINARY EXCAVATIONS IN A RECENTLY EXPLORED QUATERNARY CAVE IN SHASTA COUNTY, CALIFORNIA.

IN the summer of 1902 the writer was commissioned by the department of anthropology of the University of California to search for Quaternary caves in the belt of Carboniferous limestone exposed along the lower portion of the McCloud River. The work of that year led to the exploration of the Potter Creek cave which has already been described in SCIENCE.*

* Wm. J. Sinclair, SCIENCE, N. S., Vol. XVII., No. 435, pp. 708–712, May 1, 1903.

During the summer of 1903 further explorations were carried on by the writer under the direction of Professor J. C. Merriam, in the hope that caves of somewhat later age might be discovered. As a result of this work cave deposits containing remains of Quaternary mammals have been found in several new localities. Of these, the cave containing the largest quantity of remains is so situated with relation to the topography of the region as to indicate that it is younger than the Potter Creek Cave. To this cavern the name Samwel cave has been given, owing to the presence in it of a pool known among the Wintun Indians as 'Samwel,' or spirit water. An Indian legend to the effect that a Wintun maiden had fallen into a very deep well in the cave while searching for water led to the most important discoveries made here.

The Samwel cave is situated on the east bank of the McCloud River and about sixteen miles above its mouth. The entrance is on a Quaternary river terrace. Measurements kindly furnished the writer by Mr. J. S. Diller, who visited the cave with him, show this terrace to be 355 feet above the McCloud River and 1,505 feet above sea level. The entrance is a large, low arched vestibule leading to a series of galleries which widen again to large chambers.

The first chamber is about twenty-five feet long. At the southeast end a vertical fissure about thirty feet high extends twenty feet into the wall. The top is arched over and the bottom is filled with a deposit of clay and stalagmite containing many bones. The highest point on this deposit is near the middle of the fissure. From this place it fans out, fills the farther end and slopes down to the floor of the main chamber where it spreads out. It has been excavated to the depth of four feet, and is seen to be composed of several strata. The whole is covered by a stalagmite capping varying considerably in thickness.

Many remains were taken from this deposit. They include limb bones, vertebrae, teeth, jaws and a large number of splintered bones. In the deposit on the floor of the chamber, near the entrance of the fissure, a dis-

tinctly chipped fragment of black lava was found six inches below the surface. Associated with it were splintered bones and remains of extinct mammals. It is possible that the flint may have fallen in from the surface or worked its way there through a small crevice in the floor, but before commencing excavation the floor had been cleared of all loose material and no crevices were observed. While not of the most conclusive character, the evidence seems to favor original association of the objects found. Bones of several extinct mammals were found cemented to the top of the stalagmite capping.

Following is a list of the species found here:

Ursus americanus Pallas.
Ursus n. sp.
Vulpes sp.
Putorius arizonensis Mearns.
Aplodontia major Merriam, C. H.
Aplodontia near *major* Merriam, C. H.
Aplodontia rufa Rafinesque.
Arctomys sp.
Lepus auduboni Baird.
Thomomys sp.
Thomomys monticola Allen.
Citellus douglasi Richardson.
Sciurus sp.
Erethizon epixanthus Brandt.
Euceratherium sp.
Haplocerus sp.
Odocoileus sp.
Equus occidentalis Leidy.
Elephas sp. (tooth fragment).
Megalonyx sp.

The materials in the fissure deposit had access at some remote date through an opening in the roof. Of this no trace can now be seen, owing to stalactitic growth. Its source was indicated by streams of bones and earth found on projecting ledges and in pockets in the fissure walls.

On the sides of the chamber opposite the fissure several small openings lead to a lower series of galleries, in one of which a large pool of water winds among the rocks. At two places in the lower labyrinth of galleries there are deposits similar to that in chamber one and from these bones and teeth were taken. From the position of these deposits they appear to have entered through fissures leading from some other chamber or from the surface.

High on the south wall of chamber one and difficult of access is an entrance to a second and larger cavern. This has a high arched roof and several tunnel-like grottos lead from it. Through a crevice caused by a fault, a great quantity of earth, angular limestone fragments and gravel have partly filled this room.

At the farthest end of one of the grottos is an oval pit-like opening, which seemed to correspond to the description of the well into which the Indian maiden fell. To explore this pit, holes were drilled in the hard floor of the grotto and into these steel pins were set for the support of a rope ladder. The well was found to widen towards the lower end and was really but the chimney of a large cavern. The skeleton of the Indian maiden lay immediately below the opening and over the greater part of the floor were strewn many bones of bear, cougar and a large extinct goat-like animal.*

The deposit on the floor of this chamber is an accumulation of mud, stalagmite and gravel. This has been excavated, in places, to a depth of four feet, and in that thickness shows six distinctly separated layers of clay, breccia and stalagmite.

Mammal remains were very abundant over the floor and through all the strata excavated. In many instances whole skeletons of carnivores and of rodents were found. There are many complete skulls and numerous dissociated limb bones. The stalagmite encrusting some of the specimens was from one to two inches thick, the bone below the covering being in a perfect state of preservation. Among the fragments are numerous split bones. Some specimens show scorings of rodents' teeth and others bear marks made by the gnawing of large carnivores.

Following is a provisional list of species from this chamber (No. II.):

Ursus n. sp.
Ursus sp.

* *Euceratherium collinum* Sinclair and Furlong. See *Univ. of Calif. Pub. Amer. Archeol. and Ethnog.*, Vol. 2, No. 1, p. 18.

Urocyon townsendi Merriam, C. H.
Procyon near *lotor* Linn.
Felis hippolestes Merriam, C. H.
Mephitis occidentalis Baird.
Mustela sp.
Aplodontia near *major*.
Erethizon epixanthus Brandt.
Lepus auduboni Baird.
Lepus sp.
Microtus sp.
Neotoma fuscipes Baird.
Neotoma sp.
Sciurus sp.
Citellus douglasi Richardson.
Euceratherium collinum Sinclair & Furlong.
Euceratherium n. sp.
Odocoileus sp. (*a*).
Odocoileus sp. (*b*).
Megalonyx sp.

The majority of the remains discovered are those of large carnivora or of cave-inhabiting rodents. This would indicate that these animals have lived in the caves. Such evidence is supported by the fact that the remains of ungulates and other forms which would naturally fall prey to the carnivora are generally much scattered and broken, and in some instances show marks of carnivore teeth.

The position of the present entrance precludes the supposition that any animal could by means of it have gained entrance to this chamber. It is seventy-five feet above the cave floor with a straight drop from top to bottom. The approach to this chimney is through several difficult and tortuous galleries, a route which animals would not follow, as it is far from the light.

Under a portion of the overhanging wall at the southwest side of chamber two, a small fan of stalagmite-covered detrital matter sloping from the outside may mark a former entrance now entirely choked and sealed by the heavy stalagmite growth. It was possibly at this point that animals had access to the chamber, as there is now no outside entrance.

A full report on this investigation will appear later in the Publications of the University of California.

E. L. FURLONG.

UNIVERSITY OF CALIFORNIA,
April, 1904.

VITALITY OF PSEUDOMONAS CAMPESTRIS (PAM.) SMITH ON CABBAGE SEED.

BLACK rot of cabbage and cauliflower, caused by *Pseudomonas campestris* (Pam.) Smith, is a widespread and often destructive disease in the United States. The experience of farmers indicates that the disease may be transmitted by means of the seed; but plant pathologists have doubted this because it seemed impossible that the organism could retain its vitality for several months on dry seeds. *P. campestris* forms no spores. Moreover, Russell and Harding* found that when fresh bouillon cultures were dried at 29° C. on cover slips and kept in darkness 'an exposure of 45 hours invariably sufficed to destroy the vitality of the organisms.'

Recently the writers have investigated this subject and find that *P. campestris* may live on dry cabbage seed for at least ten months. A quantity of cabbage seed was wet with water into which a culture of *P. campestris* had been thoroughly stirred. The seed was then dried and stored in test-tubes in darkness. Some tubes were simply plugged with cotton, while others were plugged with cotton and then sealed with paraffin. Once a month the seeds were tested for the presence of living germs of *P. campestris*. This experiment is unfinished; but at the end of ten months some live germs were found (both in paraffined and in unparaffined tubes) and healthy cabbage plants inoculated with these germs showed the characteristic lesions of black rot in from one to three weeks.

The writers have also proved that germs of *P. campestris* actually do occur on cabbage seed. Four black-rot-infected seed-cabbage plants from Long Island were threshed separately and the seed rinsed in sterile water. Cultures of this water showed the presence of *P. campestris* on three lots of seed. The identity and pathogenicity of these cultures were proved by inoculations into plants. Other portions of the water were injected directly into plants and black rot produced in six out of twelve cases. On combining the re-

* Russell, H. L., and Harding, H. A., 'A Bacterial Rot of Cabbage and Allied Plants,' Wis. Agr. Exp. Sta. Bul. 65: 19.

sults of the two methods the presence of *P. campestris* is shown on the seeds of all four of the seed plants examined.

Full details of these studies will soon appear in Bulletin No. 251 of the New York Agricultural Experiment Station.

H. A. Harding,
F. C. Stewart.

Geneva, N. Y.

A NOTABLE PALEOBOTANICAL DISCOVERY.

The term Cycadofilices proposed by Potonié for the group of synthetic genera, which in Paleozoic times were abundant and widely distributed, and which so curiously combine filicinean and cycadean anatomical characters with foliar organs entirely fernlike in form, seems likely to become a permanent acquisition to taxonomy; although some students, following so eminent an authority as Zeiller, still regard the Cycadofilicales as merely a specialized group of ferns.

The announcement a few months ago* by Professors Oliver and Scott that the gymnospermous seeds named by Williamson *Lagenostoma*, were borne by a species of *Lyginodendron* is most interesting. This identification is based on the identity of the capitate, often stalked, glands, which clothe the enclosing envelope, with those clothing the vegetative organs of *Lyginodendron Oldhamium*. These glands show the closest possible agreement in size, form and structure, and no other known Carboniferous plant possesses them. In addition, the vascular system of the enclosing cupule was well developed, the structure of the large bundle agreeing with the petiolar strand in *Lyginodendron;* and the minute characters in the former are in close agreement with those of the xylem of the foliar organs of the latter, so that the evidence presented is fairly conclusive.

Now *Lyginodendron* with a number of species under a variety of names ranges from the lower Carboniferous into the Permian. The calcified remains, often beautifully preserved and including roots (*Kaloxylon*), stems (*Lyginodendron*) and leaves (*Sphenopteris*) have been associated with the carbonaceous impressions of large finely divided fronds of the *Sphenopteris* type.

The minute structure of these parts is as well known as in living forms, as are the corresponding structures in *Heterangium,* another genus, considered in a general way ancestral to *Lyginodendron* and exhibiting a balance of filicinean characters; while in the latter, though many filicinean characters remain, the cycadean features are more pronounced, the primary bundles are isolated and arranged around a large pith, the vascular bundles both primary and secondary are similar to those of the peduncles in living cycads, and the roots, while agreeing with those of the Marattiaceæ when young, after their secondary thickening are entirely gymnospermous.

The fructifications of this curious plant have hitherto remained unknown, although certain poorly preserved filicinean remains of the *Calymmatotheca* type have been so regarded.*

The structure of the seed as now set forth furnishes a preponderance of gymnospermous features, at the same time emphasizing the combination of transitional characters which distinguish the Cycadofilicales, and furnishes good ground for supposing that many of the plants which furnished the elegant fronds of *Alethopteris, Neuropteris,*† *Sphenopteris,* etc., had already advanced in seed, bearing as far as, if not farther than, the modern Cycads.

The seed under consideration, as does the similar one of *Lagenostoma ovoides,* approaches the cycadean type in that the integument and nucellus are distinct in the apical region only, where the former becomes massive and complicated, consisting of nine chambers radiating from the micropyle. The free portion of the nucellus tapers upward reaching the exterior and plugging the micropylar opening; the separation of the nucellar epidermis from the underlying parenchymatous body of the free part of the nucellus forms a bell-shaped

* Read before the Royal Society, May 7, 1903, and reprinted from the *Proceedings.*

* Described by Benson (Ann. Bot. **18**: 161–177, pl. 11, 1904) and regarded as the microsporangial sori of Lyginodendron.

† In a recent note Professor Oliver (New Phytologist, **4**: 32, 1904) records seeds on the fronds of Neuropteris heterophylla.

pollen chamber, open apically and containing pollen grains in its lower part. The vascular system of the seed consists of nine bundles radiating from a single supply bundle and running to the apex.

It furnishes something more than suggestive evidence of the origin of the Mesozoic Bennettitales and Cycadales, on the one hand, and the Paleozoic Cordaitales and other and later gymnospermous orders on the other hand, from some type of Paleozoic Cycadofilicales, the latter leading back to the true Filicales as recently diagrammatically set forth by Coulter.*

Professor Seward† has styled this discovery of Oliver and Scott as 'one of the most important contributions to botany published in recent years.' The full details, which are promised soon, will be awaited with impatience.‡

EDWARD W. BERRY.

CURRENT NOTES ON METEOROLOGY.

ANTARCTIC METEOROLOGY.

A RECENT number of the *Bulletin of the American Geographical Society* (Vol. XXXVI., 1904, 22–29) contains an account of Dr. Otto Nordenskjöld's Swedish Antarctic expedition of 1902–03, in which are numerous notes of meteorological interest. During five months, beginning with May, there was a period of storms with short intermissions never exceeding three days, during the whole of which period the average wind velocity was 23 miles an hour, and during a whole fortnight it averaged 45 miles. The gales from the southwest brought the lowest temperature recorded. The stormiest day, in June, with a mean wind velocity of 63 miles an hour, was one of the coldest experienced (— 24° F.). The mean temperature for the first year was about 10.2° F.; that of the summer being 28.2° F. The general direction of the winds was southwest, *i. e.*, out from the south polar region.

VERTICAL DECREASE OF TEMPERATURE IN THE FREE AIR.

AT the February meeting of the Royal Meteorological Society in London, Mr. W. H. Dines read a paper on 'Observations by Means of Kites at Crinan in the Summer of 1903,' this being a continuation of the work done in the previous summer, already referred to in these columns. The results of the ascents during August, 1903, show a mean temperature gradient for the first 5,000 ft. of 3.2° per 1,000 feet. This is at the rate of about .59° C. per 100 meters. In the previous summer the average rate per 100 meters was found to vary from .56° C. per 100 meters in a column of 500 meters to .43° C. at 3,500 meters. The averages thus accord quite closely with those given in Hann's 'Lehrbuch der Meteorologie,' pp. 157–161.

THE SAHARA AND THE SOUDAN.

ACCORDING to Sir Frederic Lugard, High Commissioner for Northern Nigeria, the sands of the Sahara are gradually encroaching on the districts of the Sudan which border the desert on the south. Sir Frederic is of the opinion that the desiccation of the country is chiefly caused by the destruction of the young acacias and tamarinds, which are cut down by the natives, and given to the camels for fodder.

MONTHLY WEATHER REVIEW.

THE *Monthly Weather Review* has recently contained an unusual number of articles of general interest. Vol. XXXII., No. 1, 1904, contains an account of the tornado of January 22, at Moundville, Ala. This tornado was first noted about 1.20 A.M., the previous evening having been warm, with fairly heavy rains at intervals, and the wind blowing in heavy gusts from southeast and south. At Moundville nearly every building was demolished, and thirty-six persons were killed and eighty injured, out of a total population of about 300. The storm moved northeast; the

* 'Morphology of the Spermatophytes,' p. 172, 1901.

† Presidential Address, Botanical Section, British Association for the Advancement of Science, Southport, 1903.

‡ These were read before the Royal Society, January 21, 1904, and a new class of seed-plants, the Pteridospermæ, was proposed to include these and similar remains.

path was five miles long, and 250 yards wide at the point of greatest destruction. The funnel-shaped cloud 'had a phosphorescent glow.' Debris from Moundville is reported to have been carried nineteen miles to the northeast. The tornado occurred on the southeast side of a well-marked barometric depression, according to the usual habit of these disturbances.

Concerning lightning rods, Professor W. S. Franklin, in the same number of the *Review*, states that, 'given a good ground connection, then directness of path to ground from the region which is to be protected is so important that the matter of insulating the rod from the building, either by air spaces or by glass, is of no importance whatever in comparison. If the path is direct, there is no need of insulation, and if the path is roundabout, effective insulation is not practically feasible.'

A short article on 'Paths of Storm Centers' brings together a few essential facts regarding the tracks and velocities of cyclones.

NOTES.

It is stated (*Bull. Amer. Geogr. Soc.*, XXXVI., 39) that the front of the Muir Glacier has retreated two and a half miles in four years, which is a higher rate of retrogression than has been observed before. The present indications are that the glacier will before long cease to reach tide water.

During 1903 Mr. W. G. Black, of Edinburgh, collected in an open dish, 8½ inches square, 17 ounces of 'dust and soot.' This would give a fall of 32 ounces per square foot.

R. DeC. Ward.

WILLIAM HENRY PETTEE.

The senate of the University of Michigan has adopted the following memorial as offered by the committee, Professors Prescott and Demmon:

Again the university senate has been sorely stricken, and we are called to record the loss of another of our beloved members. For nearly thirty years he has sat with us in all our deliberations, scrupulously attentive to every official duty, thoroughly informed on all university affairs, courteous, firm and wise. Possessed of a genial and kindly nature, of refined sensibilities and a wide culture, he early won the respect and affection of his colleagues and held these steadily to the end. He has gone from us honored by many years of valuable service to the university, and his loss must continue to be felt in many ways for a long time to come. It seems peculiarly fitting that the senate should come together and spread upon its records some expression of the esteem and love with which we cherish his memory and of our high regard for his services in the great cause of learning, services to which his life was devoted without reserve.

Professor Pettee died at his home on May 26, 1904. He was engaged in his regular duties in the university up to the last evening before his death, but his health had been impaired for nearly a year and his physician had informed him of the uncertain tenure of his life.

William Henry Pettee was born in Newton Upper Falls, Mass., January 13, 1838, of representative New England parentage. His father was a manufacturer of cotton fabrics and of mill machinery. In boyhood his studious tastes had to be restrained and his college preparation delayed out of regard to his somewhat slender bodily frame. He entered Harvard College at nineteen years of age, took high rank in the required classical course of that period, was selected to deliver a Latin oration in the junior year, and graduated with distinction in the class of 1861. He continued in graduate studies in the same university for over three years, receiving the degree of master of arts in 1864, studying at first in the engineering work of the Lawrence Scientific School and then in the college, where at the same time he was an assistant in chemistry under Professor Josiah Parsons Cooke, Irving professor of chemistry and mineralogy and then well known as an author. Mr. Pettee had taken chemistry as his elective subject in his junior year. Of his remaining opportunity for election he had chosen Spanish, in this having the pleasure of reciting for a year and a half to James Russell Lowell. As a chemical assistant, 1863–65, he taught the required chemical physics to the sophomore class and had charge of the elective section of the

juniors in the laboratory. His period of study and travel in Europe was one of three years, from 1865 to 1868. Here his main work was in the Royal Mining Academy of Saxony, at Freiberg, with vacations in the mining regions of Germany.

In 1868 Mr. Pettee returned to Harvard University as a teacher in the school of mining and practical geology then established under the direction of Josiah D. Whitney, the Sturgis-Hooper professor of geology, the director of various geological surveys, including the Lake Superior region and California, and author of works upon the sources of metallic wealth, widely circulated in this country. Mr. Pettee's appointment in 1869 was that of instructor in mining. He was advanced in 1871 to the rank of assistant professor in the same branch, with plans for his work upon the geological surveys to be carried on under the auspices of the Harvard School of Mining.

In the summer of 1869 Professor Pettee made a geological and topographical survey of the South Park of Colorado, a district which had not been covered by the United States geological surveys. In the year 1870–71 he was granted leave of absence for the California State Geological Survey. Besides making a study of gold-bearing gravels, he undertook systematic work in correction of the determination of altitudes by the barometer. Some of the results of this investigation, collected from the detailed reports of the survey, were published by authority of the California State Legislature in 1874, entitled 'Contributions to Barometric Hypsometry,' with Tables for use in California, and a Supplement with Additions in 1878. The work embraced comparisons of the observations taken with the accumulated results of observers in Europe and these could be collected but slowly from scattered publications. A library was formed on the subject. Professor Whitney's estimate of the onerous labor, the accuracy and perseverance of Professor Pettee's work in this undertaking appears in the prefatory note to the volume above mentioned.

From 1871 to 1875 in addition to other duties Professor Pettee gave instruction to an elective section of undergraduates in physical geography, geology and meteorology. Before 1875 the conditions of the gift supporting a school of mining at Harvard were altered and the special instruction in this subject was withdrawn. It was in 1875 that Professor Pettee was appointed to a professorship of mining engineering and related subjects in Michigan. How the turn of events here again released our friend from the limits of a professional specialty has been well stated by his honored colleague, Dean Green, of the engineering department, to whose article on the 'Life of Professor Pettee' this memorial is very much indebted.

In the first semester of 1879–80 Professor Pettee was granted leave of absence from this university to continue his investigation of the auriferous gravels. His report of that work was published as an appendix to the first volume of Whitney's 'Contributions to American Geology' from the Museum of Comparative Geology at Cambridge. It has been adjudged to show that careful examination of phenomena, weighing of evidence, and painstaking accuracy, which those best acquainted with Professor Pettee always expect in papers prepared by his hand.

In the meetings of the faculty Professor Pettee was rarely absent and in them he has naturally served as the undoubted arbitrator upon questions as to previous or conflicting legislation. A member of three faculties, in each he was equally serviceable, and his judgment was asked for more often than offered. He has been annually and inevitably reelected as the secretary of the university senate, and this body owes much to the form he has given to records and reports, both in the making of history and through immediate publication.

It is not possible in this memorial even to enumerate all of the duties, important in administration, to which Mr. Pettee has been assigned. The files of university publications, in college libraries and everywhere, give evidence of the safeguard afforded by his editorial ability. In the organizations affiliated with the university he has been equally helpful.

The annual transactions of the American

Institute of Mining Engineers have been submitted to him for many years, from the publication office in New York, for critical proof-reading and correction. Of this extensive society he is a life member, his election dating from 1871, and he has been a co-worker with its secretary, Rosater W. Raymond. He was one of the original fellows of the Geological Society of America; a fellow of the American Association for the Advancement of Science; in which he was general secretary in 1887; a member of the American Academy of Arts and Sciences during his residence in Massachusetts; and a member of the American Philosophical Society of Philadelphia.

To his colleagues no characteristic of Mr. Pettee was more impressive than his fidelity to truth. Overstatement, exaggeration, disproportionate display were impossible to him. 'True of word and tried of deed' may well be inscribed to his memory as a Christian gentleman.

Your committee beg leave to recommend that the sincere and profound sympathy of the senate be extended to the bereaved family of our departed friend, and that a copy of this memorial be transmitted to them.

Albert B. Prescott,
Isaac N. Demmon,
Committee.

EXCAVATIONS IN TURKESTAN.

Professor Raphael Pumpelly, who is engaged in explorations in Russian Turkestan under the auspices of the Carnegie Institution, has written a letter to Dr. D. C. Gilman, the president of the institution, in which he says:

The streams that rise in the high mountains of northern Persia emerge on to the Turkoman plains forming fans, or sub-aerial deltas, covering many square miles and each making an oasis. The water is all used in irrigating these fertile spots. Beyond them is the desert. Anau, where we have excavated, is on one of these fans.

Here at Anau, about seven miles east of Aschabad, there are two great tumuli, and the ruins of a city—Anau—surrounded by moat and wall, and occupied till within the last century. The two tumuli, nearly half a mile apart, are nearly equidistant from the city at a distance of less than a mile. We have explored both of these tumuli and I have done some work in the city.

The northern and older tumulus rises 40 feet *above the plain;* the southern and younger tumulus rises 52 feet *above the plain.* Both of these start with their lowest culture strata on slight elevations in the same original plain-surface—more than 20 feet below the present surface of the surrounding plain. That is to say, the plain has grown up more than 20 feet since the settlements began. I will show, further on, the different phases of this growth.

In the older tumulus, we find a culture occupying the lower 45 feet, and distinguished by the technique and decoration of its wholly handmade and interesting pottery. This is succeeded in the upper 15 feet by a more advanced culture in which the finding of some remnants of bronze implements and lead beads (all wholly altered to salts of the metals) show a beginning acquaintance with bronze, while the still handmade pottery has changed and become more developed. Throughout this tumulus we have found nothing recognizable as a weapon of offense in either stone or metal, though flint knives abound.

The southern, younger tumulus, starts with a developed wheel-made pottery, unpainted and of a technique wholly different from that of the older tumulus—though some hand-made pottery occurs not unlike some of the younger products of the older tumulus.

From its base under the plain to its summit this tumulus has 74 feet of culture strata. There are evident here at least two sucessive cultures. Of these, that of the lower 62 feet is wholly in the bronze stage (but with survival of flint implements), while the upper 14 feet are marked by decided changes and by the introduction of iron, of which the wholly oxidized remnants of some implements were found.

We have thus at least four distinct cultures occupying 136 feet, with a break in the column between the end of the old and the beginning of the new tumulus. We do not know how great this gap may be, but the presence of

some fragments of wheel-made pottery on the surface of the older tumulus, as well as in the neighboring irrigation column, seems to represent a transition from the older to the newer. This suggests the possibility that the gap was filled by the strata which has disappeared through wind and water erosion, and which must, in any event, have been of considerable thickness.

Through all the cultures except the last—that of the iron stage—there ran a remarkable and characteristic burial custom. The children—at least certain children—and seemingly only children, were buried in the houses, under the floor, in a layer of fire-hardened earth. I was struck last year by the fact that all the human bones I sent from here to Professor Zittel were those of children. The skeletons lie on the side with the knees drawn up in the 'liegende höcker' position. With them have been found beads of turquoise, lapis lazuli, carnelian and other minerals. Eighteen of such burials have been studied.

THE GOLDEN TROUT OF MT. WHITNEY.

THE most beautiful and in many respects the most interesting of all the trouts is the famous golden trout of Mount Whitney. It is known only from a few small mountain streams high up in the Sierras on the western slopes of Whitney, the highest mountain in the United States. It was formerly abundant in Volcano Creek, tributary to the South Fork of Kern River, and has been introduced into Cottonwood Creek and perhaps other streams on the east slope of the Sierras, tributary to Owens Lake. Its original home seems to have been Volcano Creek and in that stream only above the falls.

During the last few years many camping parties have gone into the region and reports have reached the Bureau of Fisheries that the species is in danger of extermination. Recently Stewart Edward White, the author of 'The Blazed Trail,' called attention to the danger, and President Roosevelt, the true naturalist that he is and always alive to more matters of interest than any one else, addressed a letter to the Commissioner of Fish and Fisheries, asking that an investigation be made to determine what steps should be taken for its preservation.

In compliance with the President's request, Commissioner Bowers is sending a party to the Mount Whitney region to find out all they can about the golden trout. It is intended to determine its present distribution, in what streams it is now found, into what it has been transplanted, into what additional streams it might be introduced, and whether the species can be propagated artificially. It is believed there will be no difficulty with cultivating the species if a few individuals for breeding stock can be gotten to one of the government fish hatcheries. This will not be an easy task, as the fish will have to be carried on pack-horses for 24 to 48 hours down the east slope of the Sierras through a semi-desert region to Lone Pine, or 3 or 4 days to Visalia.

The expedition that will conduct these investigations will be under the immediate direction of Dr. Barton W. Evermann, assistant in charge Scientific Inquiry in the Bureau of Fisheries. The other members of the party will be Dr. Oliver P. Jenkins and Professor Rufus L. Green, of Stanford University, Professor Chancey Juday, of the University of Colorado, and Captain Charles B. Hudson, the artist, who will paint the golden trout in life colors. Professor Juday will make a special study of the food and feeding habits of the trout, Professor Green will study the physical characters of the streams to be examined, while Drs. Evermann and Jenkins will give their attention to the biological and fish-cultural problems involved and to the geographic distribution of the species. The party will outfit early in July at Visalia, California, with pack outfit and enter the High Sierra by way of Three Rivers and Mineral King. About a month's time will be devoted to the investigations and it is believed that the results will be of great interest to anglers and fish-culturists.

SCIENTIFIC NOTES AND NEWS.

HARVARD UNIVERSITY has conferred the degree of doctor of laws on Dr. William Osler, professor of medicine at the Johns Hopkins University.

Yale University has conferred the degree of doctor of laws on President Charles R. Van Hise, of the University of Wisconsin, and on Dr. W. S. Halsted, professor of surgery in the Johns Hopkins University.

Amherst College has conferred the degree of doctor of laws on Dr. J. H. Tufts, of the class of 1884, now head of the department of philosophy of the University of Chicago.

Hamilton College has conferred the doctorate of science on Dr. E. S. Burgess, the botanist, professor of natural science in the Normal School, New York City.

Dr. A. W. Harris, president of the Jacob Tome Institute and formerly director of the Office of Experiment Stations of the U. S. Department of Agriculture, has been given the doctorate of science by Wesleyan University, where he graduated in 1880.

Mr. Theodore N. Ely, chief of motive power of the Pennsylvania Railroad, has been made a doctor of science by Hamilton College.

Dr. E. Pflüger, the eminent physiologist of the University of Bonn, recently celebrated his seventy-fifth birthday.

Dr. Roux has been elected director of the Pasteur Institute in the room of the late M. Duclaux. Drs. Chamberland and Metchnikoff have been elected sub-directors of the institute.

Dr. Michelerhana, of the Observatory at Milan, has been made director of the Observatory at Bologna.

President Roosevelt has appointed Rear Admiral Robley D. Evans, Rear Admiral Henry N. Manney, Brigadier-General A. W. Greely, Lieutenant-Commander Joseph L. Jayne and Professor Willis L. Moore, chief of the Weather Bureau, a board to consider the question of wireless telegraphy in the service of the government.

Dr. Robert Koch has returned to Berlin after his investigations in southwest Africa, where he has been engaged for nearly a year and a half.

It is reported that Captain Bernier will start in a fortnight for the polar regions. The arctic steamer *Gauss,* recently purchased from the German government, is now being refitted and provisioned at Quebec, and she will probably go to Halifax to secure part of her crew. She will then proceed around Cape Horn to Vancouver, and thence to Herschell Island, at the mouth of McKenzie River, with a party of Northwest mounted police to relieve the party stationed at that post. From that point Captain Bernier will make an effort to reach the pole.

Professor F. W. Rane, of the New Hampshire College of Agriculture, is spending the summer studying forest conditions in the northwest.

The address on 'The Continuous Advance of Electrochemistry,' by Professor Joseph W. Richards, published in the issue of Science for June 17, was the presidential address before the Electrochemical Society, delivered at Washington on April 8, 1904.

It is hoped that the statue of Pasteur on the Place de Breteuil, Paris, will be unveiled on the thirteenth of July, the day of the national fête.

The Berlin municipal council has decided to erect, at the cost of the city, a monument in honor of Rudolf Virchow.

Dr. Frederick Knapp, for many years professor of applied chemistry in the Chemical Institute at Brunswick, died on June 8, in his ninety-first year. Dr. Knapp was a former student and a son-in-law of Liebig's.

The deaths are also announced of M. Victor de Luynes, professor of the Paris Conservatory of Arts and Measures; of Professor Carl Weibrecht, director of the Technological Institute of Stuttgart, and of Dr. Albert Rilliet, associate professor of physics in the University of Geneva.

A new museum of anthropology has been established at Hamburg.

M. Charles E. Potron has bequeathed 20,000 francs to the French Geographical Society.

The American Institute of Electrical Engineers held a meeting at Chicago under the presidency of Mr. Bion J. Arnold. The meeting was devoted to a discussion of high tension transmission.

MR. ANDREW CARNEGIE has given to the British Museum the restoration of a skeleton of Diplodocus, made under the direction of Mr. J. B. Hatcher. Invitations were sent by Dr. E. J. Holland, director of the Carnegie Museum, to view the restoration on June 30.

THE council of the jubilee foundation for German industry, which recently met in Berlin, has made appropriations amounting to over $12,000. Among the subsidies is one of $2,500 to Dr. Garbe, of Berlin, to study the American railway system, and one of $1,200 to Professor Nernst at Göttingen for researches at high temperatures.

AT the forty-fifth meeting of the Society of German Engineers, held recently at Frankfort, it was announced that the lexicon of technology undertaken by the society is about half completed. The cost of this work will be over $100,000, for which the society has made itself responsible.

A LABORATORY for the study of beet sugar manufacture, a branch of the Agricultural School of Berlin, was opened on May 8.

THE London *Times* states that Mrs. Percy Sladen, of Northbrook-park, Devonshire, in the desire to perpetuate the memory of her late husband, Mr. Walter Percy Sladen, sometime secretary and vice-president of the Linnæan Society, has undertaken to devote the sum of £20,000 to the promotion of scientific research, particularly in the subjects in which he was chiefly interested. She proposes to assign this sum under the name of the Percy Sladen Memorial Fund to certain trustees, in the first place of her own appointment, who are directed to employ the income arising therefrom, in their uncontrolled discretion, to 'any research or investigation in natural science, and more especially in the sciences of zoology, geology and anthropology.' They are also empowered, if they think fit, to accumulate the income for the purpose of fitting out, or assisting to fit out, any expedition designed to further such research. The following gentlemen, whom Mrs. Sladen has requested to be the first trustees, have consented to serve: Her brother, Dr. Tempest Anderson, of York; Mr. Bailey Saunders, Mr. Henry Bury, Dr. Henry Woodward, F.R.S., Professor Howes, F.R.S., and Professor Herdman, F.R.S. On the occurrence of any vacancy among these trustees Mrs. Sladen reserves to herself the right to nominate their successors; but by the deed of endowment it is provided that eventually five trustees shall be severally nominated for a period of five years each by the following bodies in rotation, so far as they may have signified their acceptance of the power of appointment; the Royal Society, the Linnæan Society, the trustees of the British Museum and the Universities of Oxford and Cambridge.

FROM September 15 to 18, 1903, a conference of the engineers of the Reclamation Service was held at Ogden, Utah. At the time of this meeting the Reclamation Service had been in active operation for over a year and projects in each state had reached a point at which their relative merits demanded consideration. It was, therefore, deemed advisable to bring the principal engineers together, in order to discuss somewhat informally the methods and results of work. The eleventh irrigation congress was in session then at Ogden, and delegates were in attendance from the thirteen states and three territories named in the reclamation law, as well as from Texas and the country farther east. The engineers of the Reclamation Service were thus enabled to meet public men and others who are interested in the work of irrigation and to exchange views freely with them. The proceedings of this conference of reclamation engineers, compiled by Mr. F. H. Newell, chief engineer, have been recently published by the United States Geological Survey as No. 93 of its series of Water-Supply and Irrigation Papers, a volume of about 350 pages filled with valuable data. Besides the purely technical discussions and addresses, the paper includes several interesting speeches made to the engineers by various governors, senators and other prominent people. It is published for gratuitous distribution and may be obtained by application to the Director of the U. S. Geological Survey, Washington, D. C.

THE Paris correspondent of the London *Times* reports that some fifty men of science

assembled on June 19 at the house of the Prince of Monaco to listen to a paper read by M. Charles Rénard, a member of the permanent committee of the International Naval Association, on a new scheme for a polar expedition. M. Bénard holds that only two kinds of exploration in the polar basin are at present rational—namely, annual explorations along the perimeter of the Arctic Circle, like that of the Prince of Monaco in Red Bay or that of Greely in Port Conger Bay, or else great expeditions well within the Polar Sea, with special boats fitted up as observatories and laboratories, solid enough to resist the ice pack, and capable of carrying provisions for the length of time required by the itinerary. M. Bénard explained at length why the only feasible and rational route of penetration of the Polar Sea is one a little north of that followed by the *Fram*. The expedition ought to start from a Norwegian port, cross the southern portion of Barents Sea, take in dogs at Karabora, coast along Yalmal, ship at Port Dickson its coal, transported thither by special steamer, pass at the end of the summer along the Peninsula of Taimyr, arrive by the end of the autumn at the islands of New Siberia, and then, instead of going northward, as did the *Fram*, manage at all costs, even if it be necessary to winter in the Liakhoff or Bennett Islands, to reach a point on the 150th degree of east longitude. Thence the ship or ships need only drift with the ice. M. Bénard urged the utility of having the expedition composed of two vessels in touch with each other by means of wireless telegraphy. The expedition should take three years, but be provisioned for five. It would not cost more than $300,000. The company signed a memorandum declaring this expedition to be of scientific utility.

It is stated in the London *Times* that the man-lifting kite, as invented by Mr. Cody, has during the last few days been subjected to further trials at Aldershot with the view of testing its feasibility and usefulness for observation purposes in war time. The main features claimed for the kite are, first, its extreme simplicity and the ease with which the various component parts required to work it can be transported from place to place; and, secondly, that it can be flown in heavy wind such as would render the use of the war balloon almost impossible. A number of Royal Engineers are now under instruction in the working of the kite in order that it may be thoroughly tested.

UNIVERSITY AND EDUCATIONAL NEWS.

Mrs. Henry Whitman, of Boston, has made public bequests aggregating more than $200,000, including $110,000 to Radcliffe College and $10,000 to Harvard University.

Mr. George Ehret, of New York, has given $10,000 to the permanent fund of Hamilton College.

The Secretary of the Interior has approved the application of the board of trustees of the Columbian University of Washington to change the name of that institution to the George Washington University.

Dr. C. Alphonso Smith, professor of English literature at the University of North Carolina, has been elected president of the University of Tennessee, succeeding Dr. Charles W. Dabney, who has become president of the University of Cincinnati.

Professor George S. Williams, of the College of Civil Engineering, in Cornell University, has resigned to accept the chair of civil engineering in the University of Michigan, made vacant by the death of Professor Greene.

Carl C. Thomas, instructor in marine engineering at the University of California, has accepted a call to Cornell University to the assistant professorship in marine engineering at Sibley College. He will succeed Professor William F. Durand, principal of the graduate school in marine engineering, who has been called to Stanford University.

Dr. T. F. Nichols has been appointed professor of applied mathematics at Hamilton College.

Dr. C. C. Stewart, of the University of Pennsylvania, has been appointed professor of physiology at Dartmouth College. At the same institution C. A. Holden, in mathematics, and G. R. Lyman, in botany, have been appointed to assistant professorships.